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A SUMMARY OF 200 NEUROLOGICAL AND PSY-
CHIATRIC ADMISSIONS FROM THE CANADIAN
ARMY SERVICE FORCES.*

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Christie St. Hospital, Toronto, is one of the larger institutions of the Department of Pensions and National Health, devoted to the medical investigation and treatment of pensioners and other ex-service men of the last war. The hospital is fully equipped, has specialized clinics and is familiar with the soldier problem in all aspects, having been in continuous operation since 1918. The district served is the largest in Canada, as to area, population, number of soldier enlistments, and pensioners from the last war.

On mobilization for the present emergency, the facilities of this department were placed at the disposal of the Department of National Defence. Because of its location, this hospital serves the largest Military District in Canada, the main central area of the Province, extending from Lake Ontario to James Bay, and designated "Military District No. 2." Further, a large training and assembling area is included in the district; thus, troops from all over the Dominion are, at one time or another, billeted here.

A statistical survey of these cases, even though limited in scope, might be of value, as a large proportion of the neurological and neuro-psychiatric ineffectives, had been referred to this hospital for observation and report. (See Table I.)

In the twelve month period of October 1, 1939 to September 30, 1940, 303 patients were admitted for investigation, and of these 200 consecutive admissions have been summarized, according to the details in the accompanying tables. These patients came from all Canada; 118 were enlistments in Military District No. 2; 82 were soldiers recruited in all other districts, from Halifax to Van-

* Read at a meeting of the Section of Neurology and Psychiatry, Academy of Medicine, Toronto, October 11, 1940.

Grateful acknowledgment is expressed to Dr. A. G. Crisp and Miss B. G. Coxon of my staff for valuable assistance in preparation of the material for this paper.

TABLE I.
SUMMARY OF TWO HUNDRED NEUROPSYCHIATRIC ADMISSIONS.

| | Constitutional psychopathic inf. | Mental defective. | Epilepsy. | Psychosis. | Psychoneurosis, etc.* | Organic disease, nervous. | Somatic disease. | No appreciable disease. | Total. |
|---|----------------------------------|-------------------|-----------|------------|-----------------------|---------------------------|------------------|-------------------------|--------|
| Number of cases. | 70 | 32 | 14 | 11 | 17 | 22 | 16 | 18 | 200 |
| Age (average) | 30.8 | 26.3 | 25.7 | 29.9 | 32.7 | 31.2 | 30.2 | 25.3 | 29.3 |
| SERVICE (in days) | | | | | | | | | |
| (1) Canada. | 10,877 | 5,096 | 1,904 | 1,268 | 2,152 | 3,602 | 3,151 | 2,615 | 30,755 |
| (2) Overseas. | 1,869 | 457 | 410 | 166 | 788 | 821 | 381 | 194 | 5,086 |
| (3) Ex-service (veterans of war 1914-18). | 10 | 3 | 0 | 0 | 4 | 3 | 3 | .... | 23 |
| HOSPITALIZATION PERIODS: | | | | | | | | | |
| (1) Admissions to hospital. | 126 | 48 | 18 | 17 | 33 | 32 | 27 | 25 | 326 |
| (2) Total days in hospital. | 2,278 | 824 | 214 | 248 | 815 | 882 | 587 | 232 | 6,080 |
| (3) Total days in Christie Street Hospital. | 889 | 278 | 175 | 148 | 260 | 487 | 155 | 144 | 2,536 |
| CRIMES IN THE ARMY: | | | | | | | | | |
| (x) None. | 51 | 20 | 14 | 10 | 13 | 21 | 15 | 12 | 162 |
| (1) A. W. L. | 30 | 34 | .... | .... | 8 | 1 | .... | 14 | 87 |
| (2) Drunk. | 4 | .... | .... | .... | .... | .... | .... | .... | 4 |
| (3) Insubordination. | 2 | 3 | .... | 1 | .... | .... | .... | 3 | 9 |
| (4) Desertion. | 1 | .... | .... | .... | 2 | .... | .... | .... | 3 |
| (5) Minor. | .... | .... | .... | .... | 1 | .... | 1 | .... | 2 |
| ENVIRONMENT: | | | | | | | | | |
| (1) Physical health family. | | | | | | | | | |
| (1) good. | 29 | 12 | 10 | 5 | 9 | 14 | 11 | 11 | 101 |
| (2) poor. | 29 | 11 | 2 | 4 | 7 | 5 | 4 | 6 | 68 |
| (3) bad. | 10 | 9 | 2 | 2 | 1 | 1 | 1 | 1 | 20 |
| (2) Mental health family. | | | | | | | | | |
| (1) good. | 27 | 12 | 6 | 5 | 9 | 19 | 13 | 13 | 104 |
| (2) poor. | 25 | 11 | 5 | 4 | 7 | 3 | 2 | 2 | 35 |
| (3) bad. | 16 | 9 | 3 | 2 | 1 | .... | 13 | 9 | 84 |
| (3) Economic status family. | | | | | | | | | |
| (1) good. | 21 | 7 | 6 | 6 | 11 | 11 | 7 | 4 | 74 |
| (2) poor. | 34 | 16 | 4 | 2 | 2 | 7 | 2 | 5 | 40 |
| (3) bad. | 13 | 9 | 4 | 3 | 1 | 4 | 1 | 1 | 15 |
| (4) Status in home. | | | | | | | | | |
| (x) both parents alive, pt. 14 yrs. | 39 | 26 | 10 | 6 | 14 | 15 | 15 | 11 | 136 |
| (1) Orphan. (pt. only 3 yrs.) | .... | .... | .... | 1 | 1 | .... | .... | 3 | 5 |
| (2) Parents separated. | 5 | .... | 3 | 1 | .... | 2 | .... | .... | 11 |
| (3) Parents divorced. | 1 | 2 | .... | .... | .... | 1 | .... | .... | 4 |
| (4) 1 parent died prior pt. 14 yrs. | 15 | 3 | 1 | 2 | 2 | 3 | .... | 4 | 30 |
| (5) 2 parents died prior pt. 14 yrs. | .... | 1 | .... | .... | .... | 1 | .... | .... | 2 |
| (6) Boarded out. | 2 | .... | 1 | .... | .... | .... | 1 | 2 | 6 |
| (7) Adopted. | 1 | 1 | .... | .... | .... | .... | .... | .... | 2 |
| (8) Orphanage. | 6 | .... | .... | .... | .... | .... | .... | .... | 7 |
| (9) Illegitimate. | 1 | 1 | .... | 1 | .... | .... | .... | .... | 2 |

TABLE I—CONTINUED.

| | Constitutional inf. | Mental defective. | Epilepsy. | Psychosis. | Psychoneurosis, etc.* | Organic disease, nervous. | Somatic disease. | No appreciable disease. | Total. |
|---|---------------------|-------------------|-----------|------------|-----------------------|---------------------------|------------------|-------------------------|--------|
| PREVIOUS PSYCHIC DISTURBANCE: | | | | | | | | | |
| (x) None..... | 38 | 7 | 11 | 4 | 13 | 17 | 13 | 18 | 121 |
| (1) Mental backwardness, (1-b included.)..... | 3 | 14 | 3 | 1 | ..... | 1 | ..... | ..... | 28 |
| (1-b) Special school..... | 1 | 6 | 1 | ..... | ..... | ..... | ..... | ..... | 8 |
| (2) Psychotic. (2-b included.)..... | 11 | ..... | ..... | 5 | ..... | 2 | ..... | ..... | 18 |
| (2-b) Psychotic institution..... | 1 | ..... | ..... | ..... | ..... | 1 | ..... | ..... | 7 |
| (3) Neurotic..... | 18 | 11 | ..... | 1 | ..... | 2 | 3 | ..... | 35 |
| UNSUITABILITY SHOULD HAVE BEEN OBVIOUS AT: | | | | | | | | | |
| (1) Examination on enlistment..... | 23 | 20 | 3 | 2 | 3 | 11 | 6 | 0 | 68 |
| Number of cases..... | 3,822 | 2,976 | 597 | 203 | 451 | 1,581 | 1,278 | 0 | 10,908 |
| Service days..... | 889 | 221 | 21 | 51 | 36 | 254 | 331 | 0 | 1,803 |
| Hospital days..... | 28 | 11 | 9 | 7 | 3 | 2 | 0 | 0 | 60 |
| (2) Primary training period..... | 5,211 | 2,480 | 1,278 | 694 | 578 | 456 | ..... | ..... | 10,697 |
| Number of cases..... | 713 | 593 | 157 | 100 | 185 | 20 | ..... | ..... | 1,768 |
| Service days..... | 3 | 0 | ..... | 1 | ..... | ..... | 1 | 0 | 5 |
| Hospital days..... | 247 | ..... | ..... | 334 | ..... | ..... | 346 | ..... | 927 |
| (3) Previous hospitalization..... | 83 | ..... | ..... | 90 | ..... | ..... | 76 | ..... | 249 |
| Number of cases..... | 12 | 0 | 1 | 1 | 4 | 5 | 3 | 0 | 26 |
| Days hospital..... | 2,762 | ..... | 100 | 203 | 868 | 1,602 | 901 | ..... | 6,445 |
| (4) Exposure, strain, infection, &c.,..... | 558 | ..... | 20 | 7 | 438 | 390 | 86 | ..... | 1,508 |
| Number of cases..... | 4 | 1 | 1 | ..... | 7 | 3 | 6 | 18 | 40 |
| Days hospital..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| RECOMMENDATIONS MADE: | | | | | | | | | |
| Category A.†..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Category B..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Category C..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Category D..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Category E..... | 63 | 30 | 12 | 11 | 6 | 15 | 7 | ..... | 144 |

* Includes alcoholism and malingering. See Table VI.

† Category A: Fit for full combatant service, all branches.

B: Fit for line of communication service.

C: Fit for home service.

D: Temporarily medically unfit.

E: Unfit for service.

couver. All arms of the forces are included. It is, therefore, considered that these statistics represent a fair cross-section of the neuro-psychiatric problem across Canada. The proportion of admissions to enlistments, is approximately one per hundred.

These 200 cases, after investigation, were finally diagnosed: constitutional psychopathic inferiority 70; mental defect 22; epilepsy 14; psychoses 11; psychoneuroses 8; alcoholism 5; malingering 4; organic nervous disease 22; other somatic disease 16; no appreciable disease 18 cases.

The average age of these patients is 29.3 years; 37 per cent being over 30 years of age. This finding is of interest, in view of the comment that "this is a young man's war."

Length of service for the group has been determined: service in Canada, 30,755 days; service overseas 5086 days; total 35,841 days; average service 179 days. After leaving Christie St. Hospital, with recommendation for discharge, these men would have a further period of service, averaging two weeks. Thirty-four cases had service overseas, and had been returned as ineffective. The 200 cases included 23 veterans of the last great war, who re-enlisted in this war. It would appear that ex-service men generally will not stand up well in this type of war.

Hospitalization figures show 326 admissions, with a total of 6080 days spent in hospital (average per man, 30.4 days). The number of days spent in Christie St. Hospital was 2536 (average per man, 12.7 days). This figure is not conclusive, but it does suggest that these patients are handled more expeditiously in the neurological or neuro-psychiatric center, than in the general medical wards. This is especially so where reference to other clinics is indicated and available. However an appreciable amount of this hospitalization was due to the fact that the patients were retained in hospital, pending completion of discharge proceedings. It is also pointed out that in the majority of cases (functional nervous disease) no attempt at treatment was made, other than incidental to complete history taking and medical investigation. Our efforts were limited to investigation, diagnosis and suggestion as to disposal.

Regarding discipline of these men: It was noted that 162, or 81 per cent, had not been crimed and that the constitutional psychopaths, mental defectives, and those with no appreciable disease, were proportionately the greater offenders. The latter group in-

cluded a number referred because they did not adjust to military routine. The disproportion of the number of absent without leave and drunks, is probably due to the fact that the crime of "absent without leave," covers the crime of drunkenness. One notes in passing, that the punishment for absence without leave, is a forfeiture of pay (in addition to forfeiture for days absent, under royal warrant). This is in lieu of former detention. The men resent this, as being unfair. One wonders if this is good for discipline. It is certainly not sound psychologically. The crime of insubordination is less prevalent than might be expected.

The environmental and hereditary factors have been studied. The results correspond to those noted in the out-patient clinics of the larger hospitals.

Under the headings of physical and mental health of the family, the entries are good, poor and bad; under "poor" where one member of the family showed impairment; under "bad" where two or more members were affected.

Similarly, the economic status of the family was studied. The classification of "bad" was used where the family had been on relief, or where marked financial difficulties were evident.

Under each of these three classifications, over 50 per cent were classified as poor or bad. In only 26 per cent of the cases was the assessment of the physical and mental health and the economic status considered as good.

Disruption of the home is shown under (4) status in home, where only 136 cases, or 68 per cent showed both parents alive when patient reached the age of fourteen years. In 30 cases, or 15 per cent, one parent had died prior to patient reaching fourteen years. In 11 cases parents were separated. There were 7 cases brought up in an orphanage. Adopted 2 cases. Illegitimate 2 cases.

Education showed some startling figures: illiterate 32 cases; did not pass examination on leaving public school 100 cases. Actually most of these left school with no good reason. High school training was reported in 25 cases, but with the majority of these it appeared to be just a matter of putting in time, rather than serious study for some form of life work. Indifference to educational advantages, is one of the main differences in the present day student, compared to the past generation, as exemplified by the study of the present group of cases in comparison with soldier groups from the last war.

The marital status showed: single 93; married 93 (living with wives); separated 7; divorced 2. Of the married ones, 37 had no children. Actually the home situation was not as harmonious as the figures would indicate, judged by both the history given and interviews with a fair proportion of the wives.

The economic efficiency of the individual was studied. Sixty per cent had no trade. Industrial success was equally bad; 27 per cent with poor employment history; 51 per cent had bad industrial record, namely, long periods of unemployment, no settled occupation, or required assistance from family or the authorities.

Inquiry as to criminal record shows that 34 cases, or 17 per cent, had been in difficulty with the police. These included 22 arrests for vagrancy; 22 arrests for drunkenness; 13 arrests for theft; 4 assault charges.

A very careful inquiry was made in each case as to previous psychic disturbance. This was denied in 121 cases, or 60 per cent. This figure would probably be decreased if a full history from outside sources were available. One should comment that the majority of the patients were fully accessible, and gave good detailed history, apparently with the utmost frankness. History showed 22 cases were backward; 8 had attended special school for backward children; 18 gave a definite history of previous psychotic disturbance (7 of whom had actually been in a mental institution); in this connection, in Ontario, we have available a complete list of all males of military age, who have been either inmates of mental institutions in Ontario, or who have been considered by the special mental health clinics. Almost no use has been made of this list. There were 35 patients who gave previous history of neurotic reaction, requiring attention, pre-enlistment.

We endeavored to classify these men as to the time when their unsuitability should have been obvious, whether (1) on enlistment, (2) during the preliminary training period, *i. e.*, prior to the man passing from the recruit class, (3) during previous hospitalization, (4) whether the unsuitability had become manifest under exposure, strain, infection, etc. The actual number of days service, and the number of days spent in hospital, in each group, is included. We have tried to determine these figures in accordance with what one should expect of the general medical officer, and not a specialist.

With regard to the question of the unsuitability being obvious on enlistment: This has been discussed with the various officers, who have been members of Medical Boards examining on enlistment. The majority of these medical officers acknowledge frankly that they made no endeavor to estimate the recruit's mental capabilities. The "Physical Standards and Instructions for the Medical Examination of Recruits for the Canadian Active Service Force," suggests that some inquiry regarding the man's education, previous occupation and surroundings, be made. This has been ignored for various reasons. (Page 17, section 26, states, "Neurasthenic and Psychopathic conditions: No recruit with a history of nervous breakdown in civil life or residence in an institution for such cases, or in whom there is reason to suspect drug addiction in any form, or who has a family history indicating nervous instability, such as migraine, eccentricity, etc., will be enlisted.")

In our estimation, the unsuitability should have been obvious in 68, or 34 per cent, on enlistment. This group shows a total service of 10,908 days; hospitalization 1803 days. For those interested in the financial aspect it may be added that 44 of these men were married. (Soldier's pay \$1.30 per day, with wives of married men receiving a separation allowance of \$35.00 per month, in addition. There is a further allowance of \$15 per month for the first child, \$12, for the second).

Referring to the second sub-heading, the number of days represented by the primary training period is difficult to determine. We believe the period should be limited to that part described as "recruit training." This will vary with the different arms of the service, and actually does vary in different units of the same service.

This group consisted of 60 cases with 10,697 days service; 1768 days hospitalization. Again, for those interested in finances 21 of these men were married.

In considering the individual cases one is surprised to find how often it had been recognized that the man would not make an efficient soldier, and nothing was done about it. These men were side-tracked on regimental duties, fatigues, etc. They were not on training parades. Two cases of epilepsy actually observed but not reported by the responsible non-commissioned officer, etc. The Regimental Medical Officer is most frequently criticized regarding these cases, yet the Platoon Officer and the N.C.O. have the men

more or less constantly under their supervision and usually initiate the consideration of the case for disposal.

Under the third sub-heading, 5 cases should have been obvious during former hospitalization while receiving preliminary training. Their service was 927 days; hospitalization 249 days.

Under the fourth sub-heading, 26 proved unsuitable under exposure of various types—strain, change of surroundings, alteration of diet, complete change of routine, separation from families, and the course of infection. Actually only 5 of these cases showed service connection. None was definitely associated with war strain. Service 6445 days; hospitalization 1508 days.

In all cases, on discharge from hospital, the suggestion was made as to their category. It was considered that 40 of these men should be allowed to remain in category "A" (*i. e.*, fit for general combatant service), 15 were considered suitable for category "C" (*i. e.*, fit for home service only), 1 case was discharged, category "D" (*i. e.*, temporarily unfit medically, with the expectation that he would make a complete recovery), and 144 were recommended for category "E," that is, they were medically unfit, emotionally unfit, or not likely to make an efficient soldier, under the existing standards, from a medical standpoint.

Constitutional Psychopathic Group.—This group constitutes 70 cases or 75 per cent of those reviewed. We realize that the term "constitutional psychopathic inferiority" is subject to criticism, and difficult to defend on purely scientific grounds. However, it is a term that has proved its usefulness and effectiveness, in regard to the handling of these men during their army service, and in the post-discharge difficulties and pension consideration. In our use of the term, we refer to the patient as showing an abnormal, yet not psychotic behavior, that is an expression of his inherent social mal-adjustment, and that this reaction is primarily one of inferiority or inadequacy. The men so classified had a total service of 12,746 days; 12 had reached England. They included 11 with former war service. The number of hospital admissions was 126, with 2278 days hospitalization. These cases constituted a major disciplinary problem; 19 had committed 37 crimes. These figures showed the difficulties in adjustment, slightly under half gave a history of disruption at home as the possible factor. One-half failed to reach satisfactory educational requirements. Forty-

six had no trade, with poor or bad economic success in 54 cases. There was a previous criminal record in 16 cases, with 31 crime convictions.

Table II shows detail of the individual cases. We have endeavored, under "Remarks" to show other features present in addition to psychopathic inferiority. Certain of these men showed schizoid tendencies. However, we did not consider that they were truly psychotic. These might, under other classifications, be described as showing psychoneurotic, constitutional or neurasthenic tendencies. The separation here from the psychoneurotic group, is that we believe that the constitutional psychopathic element is the essential factor. Further, we recognize that in civil life, the problems of this group are usually ignored, or are temporized with. Legally, they are held responsible for their actions. One recognizes that in military life, especially in these days of mechanization, there is very little room for these men, in the general scheme of things. However, one does believe that some use could be made of them. One is strongly opposed to these men receiving discharge certificates, stating that they are medically unfit for service. Actually, they are emotionally unfit for combatant service. In these days of possible general conscription, these men should not be allowed to avoid their duty as citizens. In spite of these remarks, 20 of these men are very definitely not suitable for army life. Twenty-four however could be retained and perform work on line of communication; the remaining 36 would require discussion as to disposal. The present attitude of the army authorities is that there is no place for them. Undoubtedly they will become an establishment and pension problem later.

Mental Defective Group.—This group of 32 cases had a total service of 5553 days, with 48 admissions to hospital, and hospitalization period of 824 days. Five of these patients had over 300 days service each. They constitute a disciplinary problem. (See Table III.)

Epilepsy.—This group consists of 14 cases. Total service 2310 days; with 18 admissions to hospital, with a total of 214 days. This group showed that the epileptic could adjust himself to army routine with good facility. Three of this group carried their own luminal. Seizures were observed in two of these cases during early training, but were not reported. One case had 142 days service,

already knows all the pension arguments. One case belongs to a Huntington's chorea family; two of his cousins have also been spotted; one a defective, the other showing early choreic manifestations. (See Table IV.)

Psychotic Group.—This consists of 11 cases, 5 of whom had been in mental institutions prior to enlistment. Service 1438 days; hospitalization 17 admissions; 248 days hospital until disposed of. (See Table V.)

Psycho-Neurotic.—This group also contains the data of alcoholism and malingering, on the spread sheet. Cases, 17, with total service of 2940 days, hospitalization 815 days. As pointed out under remarks, these cases are limited to those in which the constitutional element is lacking or minimal. It is our belief that the condition is acquired and is reversible to a large degree. In the five alcoholics, it is pointed out that these cases seem able to avoid being crimined for drunkenness. The diagnosis of malingering is one that is usually avoided where possible. We do not hesitate to tell the patient, and put in writing, that we believe that he is consciously motivated, and thus give him a chance to see the error of his ways. It is questionable if a certain amount of malingering is not a soldier's privilege, as long as it is not repeated too often, or assumed to avoid a real duty required to be performed. Actually, the friendly, unmasked malingerer is sometimes a real help in discipline, and in keeping down the regimental sick parades. (See Table VI.)

Organic Nervous Disease.—This group requires little comment. There were 22 cases with service of 4413 days; hospitalization of 882 days with 32 admissions. The passing of three cases of hiatus cranii, as category "A" was obviously careless examination. (See Table VII.)

Other Somatic Disease.—This group is of interest in showing the type of cases which have been referred as functional, or neurasthenic, etc. They constitute 16 cases, with service of 3532 days, hospitalization 587 days. (These cases possibly emphasize the opinion often expressed that a diagnosis of functional nervous disease should be qualified as tentative only, unless made by a neurologist or neuropsychiatrist.) (See Table VIII.)

No Appreciable Disease.—The diagnosis is one made with difficulty though this is not evident in the group of 18 cases; 4 of these were referred because of disciplinary problems; 5 were considered

to be consciously motivated, and might possibly have been diagnosed malingering. This group had a service of 2809 days; and hospitalization of 232 days. (See Table IX.)

In addition to the above in-patients, we have seen approximately 300 out-patients, namely men who have been referred for examination. These men have short periods of service, actually some only a few days. The majority had no current hospitalization. They do show that the problem can be met by alert regimental combatant and medical officers.

After detailed study of these men, as individuals and groups, one can make certain comments, and perhaps suggestions.

The number of neuropsychiatric patients does not seem to be unduly large, yet with a little more attention to detail, could be materially reduced. It is certainly evident that while instructions laid down for examination of recruits can hardly be regarded as adequate, even these instructions, have not been adhered to.

Exception will probably be taken to the estimate that 68 cases should have been obviously unsuitable on enlistment, and 60 cases obvious in the primary training period. The exact number where action was taken to determine the suitability, or otherwise, within the primary training period, was 53. If full facts were shown as to unit, mobilization, training, etc., this figure would be undoubtedly larger. In taking the history, it is obvious that the patient's unsuitability was recognized by the N.C.O. or Platoon Officer, much earlier, and that no action was taken.

It is suggested that a short form of neuropsychiatric examination be part of the man's medical examination on enlistment. Cases in doubt could then be referred immediately, for specialist's examination and report. All cases showing an unsatisfactory adjustment to military life, should be referred for specialist's examination without delay. It should be insisted upon, that the Officer Commanding the Unit, must share the responsibility of undue retention in service of these ineffectives. Personally, I believe if the General Officer Commanding district, incorporated this as an instruction, the numbers could be brought down to a very minor figure. It is recognized that this group of patients are a problem in civil life, create many difficulties in military life, result in much concern in the immediate post-discharge period, and are always a thorn in the flesh of the pension department.

TABLE II.
CONSTITUTIONAL PSYCHOPATHIC INFERIORITY.

| Service. | Hospitali- zation. | Environment. | Pathic. |
|----------|-----------------------|--------------|---------|
| | | | as. |

TABLE II.
CONSTITUTIONAL PSYCHOPATHIC INFERIORITY.

| Case. | Age. | Service. | | Hospitali- zation. | | Army crimes. | Environment. | | | | | | | Sucess. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. | | | |
|-------|------|----------|-----------|-----------------------|------------|--------------|--------------|----------|--------------|----|----|----|----|---------|----------------|-------------------|----------|-----------|----------|----|---|-------------------------------|
| | | Canada. | Overseas. | Former. | Admission. | | Days. | C. S. H. | Environment. | | | | | | | | | | | | | |
| | | | | | | | | | 1. | 2. | 3. | 4. | 5. | | | | | | | 6. | 7. | |
| 3 | 32 | 10 | ..... | ..... | 1 | 2 | 2 | ..... | 3 | 2 | 3 | x | 5 | 2 | 1 | x | 3 | 1 | 2 | 1 | E. | Cruel father. Never adjusted. |
| 4 | 31 | 142 | ..... | ..... | 1 | 16 | ..... | ..... | 2 | 1 | 2 | 4 | 2 | 2 | 1 | x | 2 | 3 | ... | 4 | E. | Schizoid. |
| 12 | 27 | 217 | ..... | ..... | 2 | 104 | 66 | ..... | 22 | 22 | 2 | 4 | 2 | 2 | ... | x | 3 | ..... | 2 | 4 | E. | Cyclothymic. |
| 14 | 30 | 91 | ..... | ..... | 1 | 7 | 7 | ..... | 1 | 2 | 2 | x | 4 | 1 | ... | x | 2 | ..... | 2 | 2 | E. | Inadequate. |
| 16 | 37 | 90 | ..... | ..... | 1 | 3 | 3 | ..... | 2 | 1 | 2 | 4 | 2 | 1 | ... | 1 | 1 | ..... | 2 | 2 | E. | Alcoholic. |
| 19 | 24 | 39 | ..... | ..... | 1 | 6 | 6 | 1 | 1 | 3 | 3 | 3 | x | 2 | 5 | ... | x | 3 | ... | 1 | E. | Schizoid. |
| 20 | 25 | 48 | ..... | ..... | 2 | 36 | 35 | ..... | 2 | 1 | 1 | x | 2 | 1 | ... | 1 | 3 | 3 | ... | 2 | E. | Undisciplined. Drug addict. |
| 21 | 28 | 180 | ..... | ..... | 2 | 23 | 15 | ..... | 1 | 1 | 1 | 2 | 4 | 2 | 1 | 1 | 1 | ..... | 3 | 2 | E. | Asthenic. Neurotic. |
| 27 | 19 | 148 | ..... | ..... | 1 | 24 | 24 | ..... | 1 | 2 | 1 | x | 4 | 1 | ... | x | 3 | ..... | 4 | E. | Rigid home discipline. | |
| 29 | 37 | 279 | ..... | ..... | 1 | 27 | 27 | ..... | 3 | 2 | 2 | x | 2 | 1 | ... | 1 | 1 | ..... | 2 | E. | Paranoid. | |
| 32 | 29 | 144 | ..... | ..... | 4 | 55 | 12 | 4 | 1 | 2 | 3 | 1 | 4 | 2 | ... | x | 2 | 2 | 3 | 2 | E. | Alcoholic. Inferior. |
| 33 | 21 | 49 | ..... | ..... | 4 | 11 | 11 | ..... | 2 | 1 | 2 | 4 | 2 | 1 | ... | x | 2 | ..... | x | A. | Motivated. Lack of discipline. | |
| 35 | 41 | 76 | 150 | Polish | 3 | 79 | 28 | ..... | 1 | 1 | 1 | x | 2 | 3 | 1 | 1 | 1 | ..... | 3 | 2 | E. | Paranoid. |
| 36 | 32 | 53 | 133 | ..... | 4 | 95 | 8 | ..... | 1 | 2 | 2 | x | 2 | 2 | ... | 1 | 1 | 4 | 3 | 1 | E. | Repeated anxiety reaction. |
| 37 | 41 | 38 | 148 | CEF. | 2 | 84 | 7 | ..... | 1 | 3 | 1 | x | 2 | 2 | 1 | 1 | 1 | ..... | 4 | E. | Suicide family. D. A. H. | |
| 38 | 23 | 148 | 109 | ..... | 2 | 84 | 11 | ..... | 1 | 2 | 1 | 9 | 2 | 1 | ... | x | 2 | ..... | 2 | E. | Undisciplined. Hysteria. | |
| 40 | 35 | 160 | 97 | ..... | 3 | 88 | 7 | ..... | 2 | 2 | 2 | 4 | 2 | 2 | ... | x | 2 | ..... | 1 | E. | Lazy—alcoholic—dishonest. | |
| 42 | 42 | 194 | 98 | ..... | 2 | 129 | 14 | ..... | 1 | 1 | 1 | x | 2 | 2 | 6 | 1 | 1 | ..... | 4 | E. | Difficulties in home, i. e., breakdown. | |
| 43 | 30 | 12 | ..... | ..... | 1 | 6 | 6 | ..... | 2 | 3 | 2 | 2 | 1 | 1 | ... | x | 3 | ... | 2 | 1 | E. | Depressive, schizoid. |

TABLE II.—CONTINUED.

| Case. | Service. | | | Hospitali- zation. | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. | | | |
|-------|----------|---------|-----------|-----------------------|------------|--------------|--------------|------------|--------------|----|----|----|----|--------|----------|----------------|-------------------|----------|-----------|----------|----------------|---------------------------------------|-----------------------------|
| | Age. | Canada. | Overseas. | Former. | Admission. | | Days. | C. S. H. | Environment. | | | | | | | | | | | | | | |
| | | | | | | | | | 1. | 2. | 3. | 4. | 5. | | | | | | | | 6. | 7. | |
| 49 | 26 | 163 | 105 | ..... | 3 | 96 | 15 | I | 2 | 2 | 2 | x | 8 | 2 | 2 | I | I | .... | 3 | 4 | E. | Exaggerated reaction to difficulties. | |
| 54 | 36 | 274 | ..... | RN. | I | 4 | 4 | 4 | I | 2 | I | 4 | 5 | 2 | ... | I | 2 | 5 | ... | x | A. | Pending civilian and naval trial. | |
| 58 | 40 | 59 | ..... | CEF. | I | 17 | 17 | .... | 3 | I | 3 | 8 | I | 2 | ... | x | 3 | I | b | 2 | E. | Schizoid. | |
| 68 | 41 | 283 | ..... | CEF. | I | 9 | 9 | I-3 2-I | 2 | I | 2 | 4 | 2 | 3 | ... | x | I | 2 | ... | I | E. | Poor intelligence. Criminal. | |
| 73 | 23 | 291 | ..... | ..... | I | 12 | 12 | I | I | 3 | I | 2 | x | 2 | 2 | I | 2 | .... | 2 | E. | Schizoid. | | |
| 74 | 26 | 149 | ..... | ..... | 2 | 86 | 24 | .... | ... | I | 3 | 2 | x | 3 | I | x | 3 | ... | 3 | I | E. | Constitutional neurotic. | |
| 76 | 31 | 67 | ..... | ..... | 2 | 45 | 21 | I | I | 2 | 2 | 2 | x | 4 | I | x | 3 | 2 | 6 | 3 | E. | Alcoholic. Inferiority. | |
| 77 | 22 | 119 | ..... | ..... | 2 | 18 | 7 | .... | ... | 3 | I | 2 | 4 | 3 | I | x | 3 | ... | 3 | E. | Inferiority. | | |
| 78 | 32 | 102 | ..... | ..... | I | 9 | 9 | .... | ... | I | I | 3 | x | 4 | 2 | 2 | I | 3 | ... | 3 | E. | Constitutional neurotic. | |
| 82 | 27 | 367 | ..... | ..... | 2 | 24 | 12 | .... | ... | I | 3 | 2 | x | 5 | I | x | 2 | ... | 4 | E. | Pre-psychotic. | | |
| 84 | 19 | 313 | ..... | ..... | 2 | 14 | 6 | .... | ... | I | I | I | x | 2 | I | x | 3 | ... | ... | I | E. | Inferiority. | |
| 90 | 43 | 304 | ..... | BEF. | 3 | 52 | 2 | I | 3 | 2 | 2 | 2 | x | 2 | 2 | 3 | 3 | 2 | 3 | I | E. | Alcoholic. Inferior. | |
| 95 | 32 | 179 | 172 | ..... | 3 | 155 | 36 | .... | ... | 3 | 3 | 3 | 6 | 2 | 2 | ... | x | 3 | 4 | 2 | E. | Pre-psychotic. | |
| 96 | 25 | 322 | ..... | ..... | I | 8 | 8 | .... | ... | 2 | 2 | 2 | 8 | 3 | 2 | I | x | 2 | ... | 2 | E. | Physical inferiority, plus. | |
| 99 | 28 | 336 | | | I | 36 | 36 | | ... | I | I | I | x | 7 | I | ... | I | I | ... | 3 | 2 | E. | Inferior. |
| 102 | 24 | 235 | | | I | 12 | 12 | I | 2 | I | I | 4 | 2 | 2 | 2 | I | I | I | ... | 3 | 2 | E. | Schizoid. Compulsive ideas. |
| 106 | 45 | 153 | ..... | ..... | I | 13 | 13 | .... | 2 | 3 | 3 | x | 2 | 2 | 5 | x | 2 | 2 | 3 | I | E. | Pre-aged. Schizoid. | |

TABLE II.—CONTINUED.

TABLE II.—CONTINUED.

| Case. | Age. | Service. | | | Hospitalization. | | | Environment. | | | | | | | | Remarks. |
|-------|------|----------|-----------|---------|------------------|-------|----------|--------------|----|-------|-------|----|----|----|-------|--------------------------------------|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | Army crimes. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | |
| 151 | 43 | 64 | 222 | ..... | 4 | 33 | 12 | I | 2 | 2 | 2 | 2 | 1 | 2 | 5 | E. Motivated. |
| 158 | 44 | 186 | 199 | BEF. | 3 | 31 | 31 | ..... | I | I | I | 7 | 2 | 2 | ..... | E. Treated as out-patient. Inferior. |
| 167 | 30 | 89 | ..... | ..... | I | 2 | 2 | ..... | 2 | 3 | 2 | X | 4 | I | ..... | E. Pre-psychotic. |
| 169 | 26 | 82 | ..... | ..... | 3 | 45 | 10 | I | I | 3 | 2 | 6 | 2 | 2 | 3 | E. Neurotic. |
| 175 | 44 | 100 | ..... | BEF. | 3 | 64 | 4 | ..... | 3 | 3 | 3 | X | 2 | 6 | 3 | E. Neurotic and hysteria. |
| 176 | 30 | 25 | ..... | ..... | I | 5 | 5 | ..... | I | I | I | X | 2 | 2 | 3 | E. Pre-psychotic. |
| 177 | 23 | 357 | ..... | ..... | 2 | 36 | 2 | ..... | 2 | 3 | 3 | X | 4 | 2 | I | E. Inferiority. |
| 182 | 27 | 56 | ..... | ..... | I | 5 | 5 | I | I | 2 | I | 2 | X | 4 | 5 | E. Alcoholic and drug addict. |
| 183 | 38 | 50 | ..... | ..... | 2 | 42 | 18 | ..... | 3 | 3 | 2 | X | 2 | I | ..... | E. Neurotic protection. |
| 187 | 28 | 75 | ..... | ..... | I | 5 | 5 | I | I | ..... | ..... | 8 | I | 2 | I | E. Anxiety reaction. |
| 190 | 23 | 220 | ..... | ..... | I | 7 | 7 | ..... | 2 | 2 | 2 | 4 | 3 | I | ..... | C. Hysterical seizures. |
| 191 | 34 | 385 | ..... | ..... | I | 10 | 10 | ..... | I | 2 | I | X | 5 | 2 | I | C. Hysterical aphonia. |
| 192 | 34 | 77 | ..... | ..... | 2 | 8 | 6 | ..... | I | I | 3 | X | 2 | 2 | I | E. Inferior. |
| 195 | 20 | 99 | ..... | ..... | I | 8 | 8 | ..... | I | 3 | 3 | 2 | 2 | I | ..... | E. Pre-psychotic. |
| 196 | 28 | 385 | ..... | ..... | 3 | 72 | 9 | I | 2 | 2 | 2 | X | 2 | 3 | I | E. Extreme vulnerability. |
| 198 | 39 | 92 | ..... | ..... | I | 5 | 5 | ..... | 2 | I | 2 | X | 2 | I | ..... | E. Emotionally unstable. |
| 200 | 26 | 232 | ..... | ..... | 3 | 54 | 5 | ..... | 2 | 2 | 2 | 8 | 2 | 2 | ..... | E. Emotionally unstable. |
| 30.8 | | 10,877 | 1,869 | ..... | 126 | 2,278 | 889 | | | | | | | | | |

TABLE III.
MENTAL DEFECT.

TABLE III.
MENTAL DEFECT.

| Cases. | Age. | Service. | | | Hospitali- zation. | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychi- c. | Obvious. | Category. | Remarks. | | |
|--------|------|----------|-----------|---------|-----------------------|-------|--------------|--------------|----|----|----|----|----|----|--------|----------|----------------|------------------------|----------|-----------|---|--------------------------------------|---|
| | | Canada. | Overseas. | Former. | Admission. | Days. | | C. S. H. | 1. | 2. | 3. | 4. | 5. | 6. | | | | | | | | 7. | |
| 6 | 40 | 204 | | CEF. | 1 | 65 | 37 | 5 | 1 | 2 | 2 | 2 | x | 2 | 3 | 1 | x | 3 | ... | 3 | 2 | E. | Receiving War Veteran's Allowances. |
| 10 | 24 | 80 | .... | ..... | 1 | 52 | 20 | 1 | 1 | 1 | 1 | x | 2 | 1 | ... | x | 3 | ... | x | 2 | E. | Hysterical tantrums. | |
| 44 | 20 | 163 | 105 | ..... | 3 | 133 | 13 | ... | 1 | 1 | 1 | x | 2 | 1 | ... | x | 3 | 4 | ... | 2 | E. | Hysterical fugue. | |
| 48 | 23 | 115 | 152 | ..... | 2 | 21 | 7 | ... | 3 | 3 | 3 | x | 2 | 2 | 1 | 1 | 2 | ... | 3 | 2 | E. | Never adjusted. Family all neurotic. | |
| 50 | 26 | 285 | .... | ..... | 2 | 65 | 12 | ... | 3 | 1 | 1 | 8 | 2 | 1 | ... | x | 3 | ... | 1 | E. | Appendectomy 53 days, (Hospital) 42 days sick furlough. | | |
| 55 | 21 | 28 | .... | ..... | 2 | 22 | 5 | ... | 2 | 2 | 2 | x | 1 | 1 | ... | x | 3 | ... | b | 1 | E. | "Seizures." | |
| 60 | 42 | 42 | .... | BEF. | 2 | 11 | 7 | ... | 3 | 3 | 2 | x | 1 | 2 | 1 | x | 2 | ... | 1 | E. | Malingering. | | |
| 64 | 24 | 112 | | | 1 | 6 | 6 | 1 | 1 | 2 | 2 | 2 | x | 2 | 1 | ... | x | 3 | ... | b | 2 | E. | Undisciplined. |
| 67 | 20 | 118 | | | 1 | 8 | 8 | 2 | 1 | 2 | 2 | 1 | 2 | 4 | 2 | 2 | 1 | 3 | ... | ... | 1 | E. | A. W. L. during most of his service. Blood pressure 150-80. |
| 69 | 19 | 228 | .... | ..... | 1 | 2 | 2 | 1 | 3 | 1 | 1 | 1 | x | 1 | 2 | ... | x | 3 | 4 | 1 | E. | | |
| 71 | 23 | 59 | .... | ..... | 1 | 11 | 11 | 1 | 3 | 2 | 3 | x | 1 | 2 | ... | x | 3 | ... | b | 1 | E. | A complainer. | |
| 85 | 21 | 305 | .... | ..... | 1 | 5 | 5 | ... | 1 | 3 | 3 | x | 1 | 1 | ... | x | 3 | ... | b | 1 | E. | | |
| 89 | 20 | 190 | .... | ..... | 2 | 24 | 10 | ... | 2 | 2 | 2 | x | 1 | 1 | ... | x | 3 | 4 | 3 | 1 | E. | | |
| 92 | 21 | 215 | .... | ..... | 1 | 28 | 28 | ... | 2 | 2 | 2 | x | 1 | 1 | ... | x | 3 | ... | ... | 2 | E. | Malingering. Amnesia. | |
| 94 | 38 | 35 | .... | CEF. | 1 | 6 | 6 | ... | 2 | 2 | 3 | 4 | 1 | 2 | 5 | x | 3 | ... | 3 | 1 | E. | A physical weakling. | |
| 105 | 23 | 39 | .... | ..... | 2 | 21 | 7 | ... | 1 | 1 | 2 | x | 1 | 2 | 1 | x | 3 | ... | 3 | 2 | E. | Malingering. | |

TABLE III.—CONTINUED.

| Cases. | Age. | Service. | | | Hospitali- zation. | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. |
|--------|-------|----------|-----------|---------|-----------------------|-------|--------------|--------------|----|----|----|----|----|-----|--------|----------|----------------|-------------------|----------------------|-----------|--|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | | | | | | | |
| 114 | 21 | 204 | .... | ..... | 1 | 8 | 8 | 1 | 1 | 3 | x | 1 | 1 | ... | x | 3 | 4 | 3 | 1 | E. | |
| 120 | 22 | 327 | .... | ..... | 1 | 4 | 4 | 3 | 2 | 2 | x | 2 | 1 | ... | x | 3 | 4 | 3 | 1 | E. | 143 days after enlistment Category "C". |
| 124 | 21 | 31 | .... | ..... | 1 | 3 | 3 | ... | 1 | 3 | x | 2 | 1 | ... | x | 3 | ... | b | 1 | E. | Nephritis. |
| 126 | 24 | 31 | .... | ..... | 1 | 10 | 10 | ... | 3 | 3 | 2 | 3 | 1 | ... | x | 2 | ... | 1 | 1 | E. | Nodule in thyroid. |
| 133 | 25 | 36 | .... | ..... | 1 | 5 | 5 | ... | 2 | 2 | 1 | x | 2 | 1 | x | 2 | ... | 1 | 1 | E. | Had had ruptured gastric ulcer. |
| 137 | 27 | 159 | .... | ..... | 1 | 8 | 8 | ... | 3 | 2 | 2 | x | 1 | 1 | ... | 1 | 3 | ... | 1 | E. | |
| 143 | 31 | 81 | .... | ..... | 1 | 7 | 7 | ... | 1 | 1 | 3 | x | 1 | 1 | ... | x | 3 | ... | 1 | E. | |
| 159 | 30 | 151 | 194 | ..... | 2 | 19 | 5 | ... | 1 | 2 | 2 | x | 1 | 1 | ... | x | 3 | 4 | 2 | E. | Voluble hysteria, and malingering. |
| 166 | 18 | 352 | .... | ..... | 1 | 2 | 2 | 3 | 2 | 3 | 2 | x | 2 | 2 | 1 | x | 2 | ... | 1 ² C. | C. | Underage. Medical board—did not accept neuropsychiatrist's advice. |
| 174 | 20 | 219 | .... | ..... | 1 | 1 | 1 | 6 | 2 | 1 | 1 | x | 2 | 2 | ... | x | 3 | 2 | ... | E. | |
| 180 | 18 | 368 | .... | ..... | 1 | 8 | 8 | 1 | 1 | 1 | 2 | x | 2 | 1 | ... | x | 3 | ... | 3 | E. | Underage. |
| 181 | 36 | 227 | .... | ..... | 4 | 152 | 8 | 1 | 3 | 3 | 2 | x | 1 | 1 | ... | 1 | 2 | 3 | 2 | E. | Appendectomy 101 days, hospital, Belligerent. |
| 185 | 26 | 371 | .... | ..... | 4 | 94 | 5 | ... | 1 | 1 | 1 | 7 | 1 | 1 | ... | 1 | 2 | ... | 2 | E. | Malingered back injury. |
| 189 | 20 | 106 | .... | ..... | 1 | 6 | 6 | 3 | 3 | 3 | 3 | 2 | 1 | ... | x | 3 | ... | 3 | 1 | E. | |
| 193 | 19 | 91 | .... | ..... | 2 | 10 | 6 | ... | 1 | 1 | 2 | x | 2 | 1 | ... | x | 3 | ... | 1 | A. | High grade defect. |
| 199 | 19 | 124 | .... | ..... | 1 | 7 | 7 | 1 | 3 | 3 | 3 | x | 2 | 1 | ... | x | 3 | 4 | ... | E. | |
| 28.3 | 3.096 | 457 | ..... | 48 | 824 | 278 | | | | | | | | | | | | | | | |

TABLE IV.
EPILEPSY.

TABLE V.
PSYCHOTIC.

| Case. | Age. | Service. | | | Hospitali- zation. | | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. |
|-------|------|----------|-----------|---------|-----------------------|-------|----------|--------------|--------------|----|----|----|----|----|-----|--------|----------|----------------|-------------------|----------|-----------|--|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | | | | | | | |
| 5 | 22 | 71 | ..... | ..... | 1 | 13 | 13 | ... | 1 | 3 | 1 | x | 6 | 1 | ... | 1 | 1 | ... | 2 | 2 | E. | Schizoid. Bank Clerk. Ontario Mental Hospital. New Toronto, Ont. |
| 7 | 33 | 172 | ..... | ..... | 2 | 32 | 25 | ... | 2 | 2 | 2 | x | 2 | 1 | ... | x | 3 | ... | 1 | 1 | E. | Pugnacious schizoid person. Two enlistments. |
| 65 | 26 | 290 | ..... | ..... | 1 | 13 | 13 | 3 | 2 | 1 | 1 | x | 3 | 1 | ... | x | 3 | 3 | 1 | 2 | E. | Schizoid. Alcoholic. Ontario Mental Hos- pital, London, Ont. |
| 81 | 31 | 38 | ..... | ..... | 1 | 4 | 4 | ... | 2 | 1 | 2 | x | 2 | 2 | 4 | 1 | 2 | ... | ... | 2 | E. | Acute episode. |
| 129 | 22 | 31 | ..... | ..... | 1 | 19 | 19 | ... | 3 | 1 | 1 | x | 4 | 1 | ... | 1 | 3 | ... | 2 | 1 | E. | Toronto Psychiatric Hospital. |
| 154 | 20 | 74 | ..... | ..... | 1 | 17 | 17 | ... | 3 | 2 | 3 | 1 | 2 | 1 | ... | x | 3 | ... | ... | 2 | E. | Abused, orphan, schizoid. |
| 157 | 30 | 168 | 166 | ..... | 4 | 90 | 21 | ... | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 1 | 2 | ... | 2 | 3 | E. | Mental hospitalization 1935 and 1937. |
| 197 | 33 | 55 | ..... | ..... | 2 | 24 | 6 | ... | 2 | 2 | 3 | 2 | 2 | 2 | 2 | x | 3 | ... | ... | 2 | E. | Became over-active 29 days after enlist. |
| | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 29 | 203 | ..... | ..... | 1 | 7 | 7 | ... | 1 | 3 | 3 | 9 | 2 | 1 | ... | x | 3 | ... | 2 | 4 | E. | Manic-depressive. |
| 8 | 36 | 34 | ..... | ..... | 1 | 14 | 14 | ... | 1 | 2 | 1 | 4 | 2 | 1 | ... | 1 | 1 | ... | ... | 2 | E. | Depression. Enlisted without mother's consent. |
| 98 | 36 | 132 | ..... | ..... | 2 | 15 | 9 | ... | 1 | 1 | 1 | x | 4 | 1 | ... | 1 | 2 | ... | 3 | 2 | E. | Cyclothymic type—never adjusted. |
| | 29.9 | 1,286 | 166 | ..... | 17 | 248 | 148 | | | | | | | | | | | | | | | |

TABLE VI.
PSYCHONEUROSIS.

| Case. | Age. | Service. | Hospitali- zation. | Environment. | Remarks. |
|-------|------|----------|-----------------------|--------------|----------|
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TABLE VI.—CONTINUED.
MALINGERING.

| Case. | Age. | Service. | | | Hospitaliza- tion. | | | Environment. | | | | | | | | Remarks. |
|-------|------|----------|-----------|---------|-----------------------|-------|----------|--------------|----|----|----|----|----|----|-----|---|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | Army crimes. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | |
| 51 | 26 | 90 | 92 | ..... | 1 | 10 | 10 | ... | 1 | 1 | 1 | x | 2 | 2 | 2 | Upset over father's death. Examined at hospital clinic, cured in one day. |
| 110 | 21 | 52 | .... | ..... | 1 | 5 | 5 | 1 | 1 | 1 | 1 | 4 | 3 | 1 | ... | After being A. W. L. |
| 57 | 21 | 83 | .... | ..... | 1 | 23 | 23 | x | 2 | 2 | 1 | x | 1 | 1 | ... | Enuresis—copied from father. Category lowered as precaution. |
| 184 | 27 | 97 | .... | ..... | 2 | 40 | 7 | x | 2 | 2 | 1 | x | 1 | 2 | 3 | Actually marked "E" by medical board. |
| | 23.7 | 322 | 92 | ..... | 5 | 78 | 45 | | | | | | | | | |

TABLE VII.

TABLE VII.
ORGANIC DISEASE (NERVOUS.)

| Case. | Age. | Service. | | | Hospitali- zation. | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. | |
|-------|------|----------|-----------|---------|-----------------------|-------|--------------|--------------|----|----|----|----|----|----|--------|----------|----------------|-------------------|----------|-----------|---|----|
| | | Canada. | Overseas. | Former. | Admission. | Days. | | C. S. H. | 1. | 2. | 3. | 4. | 5. | 6. | | | | | | | | 7. |
| | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 18 | 60 | ..... | ..... | 1 | 4 | 4 | ... | 1 | 1 | 2 | 2 | 2 | 1 | ... | x | 3 | ... | x | E. | Large cranial hiatus, filled with ox-bone. Re-enlisted later. | |
| 18 | 35 | 181 | 60 | ..... | 1 | 41 | 39 | ... | 1 | 1 | 1 | x | 2 | 5 | 3 | 1 | 2 | ... | 3 | C. | Head injury. Workmen's Compensation case. Hiatus, temporal. | |
| 59 | 36 | 77 | ..... | ..... | 2 | 14 | 12 | ... | 2 | 2 | 2 | 2 | 2 | 2 | 3 | x | 2 | ... | x | E. | Cranial injury 1926. On compensation when en- listed. | |
| 173 | 44 | 123 | ..... | ..... | 1 | 9 | 9 | ... | 3 | 1 | 3 | x | 4 | 3 | x | 1 | 1 | ... | 3 | E. | Bald. Bilateral hiatus, visible. | |
| 103 | 41 | 154 | 167 | CEF. | 1 | 4 | 4 | ... | 1 | 1 | 1 | x | 2 | 2 | 2 | x | 1 | ... | x | C. | Hiatus left parietal. 10 % pensioner C. E. F. | |
| 165 | 31 | 219 | ..... | ..... | 1 | 14 | 14 | ... | 1 | 1 | 1 | x | 3 | 2 | x | 1 | 2 | ... | x | E. | Congenital ocular muscle imbalance—prism glasses. | |
| 34 | 24 | 165 | ..... | ..... | 1 | 25 | 25 | ... | 1 | 1 | 1 | x | 7 | 1 | ... | 1 | 1 | ... | x | D. | Paresis right sixth, recovered. | |
| 31 | 29 | 154 | 119 | ..... | 2 | 35 | 11 | ... | 1 | 1 | 1 | x | 4 | 2 | 2 | x | 3 | ... | x | E. | Bilateral deafness—non-luetic. | |
| 53 | 40 | 113 | ..... | BEF. | 1 | 71 | 21 | ... | 3 | 1 | 2 | 5 | 3 | 2 | 4 | 1 | 1 | ... | x | A. | Facial paralysis—recovered. | |
| 30 | 19 | 333 | ..... | ..... | 4 | 199 | 77 | ... | 1 | 1 | 2 | x | 2 | 1 | ... | x | 3 | ... | x | E. | V. D. G. Sulphanilamide—then periperal neuritis. | |
| 194 | 26 | 379 | ..... | ..... | 1 | 6 | 6 | ... | 2 | 1 | 2 | 4 | 3 | 1 | ... | x | 2 | ... | x | E. | Myotonic atrophica—noticed two months after enlistment. | |
| 145 | 28 | 288 | ..... | ..... | 1 | 13 | 13 | ... | 3 | 1 | 2 | 3 | 2 | 2 | ... | 1 | 1 | ... | x | C. | Migraine, controlled by ergotamine tartrate. | |
| 15 | 33 | 56 | 101 | ..... | 1 | 8 | 8 | ... | 2 | 2 | 3 | x | 2 | 2 | 1 | 1 | 1 | ... | x | E. | Migraine. Horner's Syndrome—with operative scar. | |
| 23 | 25 | 230 | ..... | ..... | 1 | 41 | 41 | ... | 1 | 1 | 1 | x | 2 | 2 | 1 | 1 | 1 | ... | x | A. | Meningitis (meningococcus) recovered. | |

TABLE VII.—CONTINUED.

| Case. | Age. | Service. | | | Hospitalization. | | | Army crimes. | Environment. | | | | | | | Trade. | Success. | Former crimes. | Previous psychic. | Obvious. | Category. | Remarks. |
|-------|------|----------|-----------|---------|------------------|-------|----------|--------------|--------------|----|----|----|----|----|-----|--------|----------|----------------|-------------------|----------|--|----------|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | | | | | | | |
| 155 | 31 | 366 | .... | ..... | 4 | 81 | 39 | I | I | I | I | X | 3 | 2 | X | I | 2 | ... | X | A. | Post-meningitic debility. | |
| 97 | 33 | 110 | 210 | ..... | 2 | 46 | 4 | ... | I | I | I | X | 5 | 2 | X | I | I | ... | X | E. | Post-meningitic debility. Of poor physique. | |
| 61 | 31 | 16 | .... | ..... | I | 6 | 6 | ... | 2 | I | 3 | X | I | I | ... | X | 3 | ... | 2 | E. | Obvious paretic. | |
| 70 | 42 | 388 | .... | CEF. | I | 97 | 97 | ... | I | I | I | X | 7 | 2 | 2 | I | 3 | ... | X | E. | Paretic manifest 6 months after enlistment. | |
| 100 | 34 | 46 | .... | ..... | I | 12 | 12 | ... | 2 | I | 3 | 4 | 2 | 2 | X | I | 2 | ... | 2 | E. | Obvious tabo-paretic. | |
| 171 | 32 | 56 | .... | ..... | I | 21 | 21 | ... | I | I | I | X | 4 | 2 | 3 | X | 3 | ... | I | E. | Post-encephalitic—Parkinson tremor noted first week. Not reported. | |
| 63 | 34 | 120 | 164 | ..... | 2 | 133 | 22 | ... | I | I | I | 4 | 3 | 2 | X | I | I | ... | X | E. | Post-encephalitic—Parkinson tremor noted on enlistment. | |
| 188 | 20 | 58 | .... | ..... | I | 2 | 2 | ... | I | 2 | 2 | X | I | I | ... | X | 3 | ... | X | E. | Chorea. Surgeon approved his enlistment. | |
| 686 | | 3,692 | 821 | ..... | 32 | 882 | 487 | | | | | | | | | | | | | | | |

TABLE VIII.
SOMATIC DISEASE.

TABLE VIII.
SOMATIC DISEASE.

[illegible]

TABLE IX.
No APPRECIABLE DISEASE.

| Case. | Age. | Service. | | | Hospitali- zation. | | | Environment. | | | | | | | Previous crimes. | Previous psychic. | Category. | Remarks. | | | |
|-------|------|----------|-----------|---------|-----------------------|-------|----------|--------------|----|----|----|----|----|----|------------------|-------------------|-----------|----------|-----|--|---|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | Army crimes. | 1. | 2. | 3. | 4. | 5. | 6. | | | | | 7. | Trade. | Success. |
| 9 | 25 | 163 | 19 | | 1 | 8 | 8 | 5 | 1 | 2 | 2 | 1 | 4 | 2 | 2 | x | 1 | 2 | ... | A. | Referred <i>re</i> A. W. L. (These to be with his wife.) Undisciplined. |
| 46 | 30 | 215 | .... | .... | 2 | 19 | 15 | ... | 2 | 1 | 2 | x | 2 | 1 | ... | x | 2 | ... | A. | Vomiting, following tonsillectomy. Preference for hos- pital life, plus tobacco. | |
| 52 | 28 | 280 | .... | .... | 2 | 39 | 19 | ... | 2 | 2 | 2 | x | 2 | 2 | 1 | x | 1 | ... | A. | Pain in groin, following physical training. V. D. G. 1939. Tired of army life. | |
| 79 | 19 | 6 | .... | .... | 1 | 4 | 4 | ... | 1 | 1 | 1 | x | 4 | 1 | ... | x | 3 | ... | A. | First drunk—fainted next morning. | |
| 83 | 20 | 302 | | | 1 | 3 | 3 | 3 | 1 | 1 | 1 | x | 2 | 1 | ... | x | 3 | 2 | ... | A. | Referred <i>re</i> insubordination—had no respect for the N. C. O's. |
| 86 | 22 | 128 | .... | .... | 1 | 9 | 9 | ... | 2 | 3 | 3 | 2 | 4 | 1 | ... | 1 | 3 | ... | A. | Admitted <i>re</i> "hysteria." Patient vulnerable. | |
| 93 | 29 | 72 | .... | .... | 2 | 10 | 5 | 3 | 1 | 1 | 1 | x | 3 | 2 | 2 | x | 2 | ... | A. | Referred <i>re</i> A. W. L. Undisciplined. Drunk when he had the money. | |
| 101 | 23 | 112 | 194 | .... | 2 | 19 | 2 | ... | 1 | 1 | 1 | 4 | 5 | 2 | 1 | 1 | 1 | ... | A. | Had seizure following appendectomy. Good type. Claims mix-up in documentation. | |
| 104 | 34 | 210 | .... | .... | 1 | 7 | 7 | ... | 1 | 1 | 1 | x | 2 | 2 | 2 | x | 2 | ... | A. | Complaint nervousness. Always introspective. | |
| 121 | 29 | 330 | .... | .... | 2 | 21 | 14 | ... | 1 | 1 | 1 | 6 | 2 | 2 | 2 | x | 3 | ... | A. | Admitted as manic-depressive. Sunstroke, plus beer. | |
| 135 | 25 | 39 | .... | .... | 2 | 17 | 7 | ... | 1 | 1 | 3 | 6 | 2 | 2 | 2 | x | 3 | ... | A. | Referred behaviour and possible dystrophy. Abused in home. Disliked army diet and marching. | |
| 140 | 19 | 140 | .... | .... | 1 | 3 | 3 | ... | 2 | 1 | 2 | x | 8 | 1 | ... | x | 3 | ... | A. | Period of confusion—drunk. | |
| 142 | 27 | 152 | .... | .... | 2 | 31 | 6 | ... | 2 | 2 | 3 | x | 2 | 1 | ... | x | 3 | ... | A. | Admitted <i>re</i> fainting attacks. Wanted discharge, so copied his mother. | |

TABLE IX.—CONTINUED.

| Case. | Age. | Service. | | | | Hospitali- zation. | | | Environment. | | | | | | | Remarks. | | | |
|-------|------|----------|-----------|---------|------------|-----------------------|----------|--------------|--------------|----|----|----|----|-----|--------|----------|------------------|-------------------|-----------|
| | | Canada. | Overseas. | Former. | Admission. | Days. | C. S. H. | Army crimes. | | | | | | | | | | | |
| | | | | | | | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | Trade. | Success. | Previous crimes. | Previous psychic. | Category. |
| 152 | 29 | 79 | .... | .... | 1 | 4 | 4 | 1 | 1 | 1 | x | 2 | 1 | ... | x | 2 | 5 | ... | A. |
| 153 | 32 | 109 | .... | .... | 1 | 9 | 9 | ... | 3 | 3 | x | 1 | 1 | ... | x | 3 | 4 | 12 | A. |
| 156 | 24 | 192 | .... | .... | 1 | 5 | 5 | 1 | 1 | 1 | 4 | 4 | 3 | 1 | x | 3 | ... | ... | A. |
| 164 | 22 | 39 | .... | .... | 1 | 10 | 10 | 1 | 1 | 1 | x | 8 | 1 | ... | x | 3 | 4 | ... | A. |
| 168 | 19 | 47 | .... | .... | 1 | 14 | 14 | ... | 1 | 1 | 2 | x | 2 | 1 | 1 | 2 | ... | ... | A. |
| 25.3 | | 2,615 | 194 | .... | 25 | 232 | 144 | | | | | | | | | | | | |

Re "migraine." Had sinus headache at 14 years. Tired of army life.

Vagrant—not vicious. Asked for a chance to make good.

Shaky on draft parade.

Claimed to be drug addict. Undisciplined.

Re headache and dizziness. Had had a sunstroke.

PRESENT DAY TRENDS IN NEUROPSYCHIATRIC RESEARCH.*

A ROUND TABLE DISCUSSION.

MODERATOR: DR. S. BERNARD WORTIS, NEW YORK CITY.

DR. S. BERNARD WORTIS (Director, Laboratory for Experimental Neuropsychiatry, New York University Medical College): This meeting is the result of a conference held at Bellevue Hospital over a year ago, when we devoted an evening to the discussion of "Present Day Trends in Neuropsychiatric Research" and invited the medical directors of various research foundations to tell us of their foundation interests—what they considered the best research leads for continued work in neuropsychiatry. Present at that meeting were: Dr. Alan Gregg of the Rockefeller Foundation, Dr. Frank Fremont-Smith of the Josiah Macy Foundation, Dr. Bernard Sachs of the Friedsam Foundation.

Dr. Gregg spoke of the variety of research in neuropsychiatry being carried on in Europe and South America in anatomy (architectonics, localization phenomena, comparative neurology, evolutionary studies), physiology, electrophysiology, embryology, psychosomatics, psychologic studies, neuropathology, pharmacology, endocrinology, neurosurgery, roentgenology, social psychiatry, genetics and heredity, and chemotherapy. Dr. Gregg emphasized the particular availability of certain areas and groups to certain specific studies. For example (this was before the European War), studies in heredity could better be carried out in a stable, non-migrating population group. It was apparent that much of the research was in basic problems.

Dr. Frank Fremont-Smith spoke of the need for carefully correlated psychosomatic studies of disease. Dr. Bernard Sachs emphasized the recent advances in biochemistry and electrophysiology in the understanding and treatment of nervous and mental disease.

To-night's round table is arranged to give the people who them-

* Report of a round table discussion held at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

selves are doing or directing research work in various neuropsychiatric centers, an opportunity to tell us briefly: (1) What they consider the present day trends are in their own special fields; (2) what means should be utilized to integrate better the work of the biochemist, physiologist, psychologist, neurologist, psychiatrist, psychoanalyst, sociologist and internist; (3) is there a public health need for research in mental health.

Any one of these topics alone offers scope for many hours of discussion, but I hope the thumb nail sketches, given by the designated contributors, will help to orient the more important trends and indicate where there is need for greater effort and coordination.

We will take up the present day research trends in the following order: (1) Anatomy and histopathology, (2) biochemistry and the vitamins, (3) psychosomatics (psychophysiology), (4) sociology, (5) psychotherapy, (6) clinical psychiatry, (7) public health need for research in neuropsychiatry.

ANATOMY AND HISTOPATHOLOGY.

DR. EDWARD J. HUMPHREYS (Director of Research, Letchworth Village, Thiells, New York): Anatomical and neurohistological studies in the field of mental deficiency have been creating increased interest in the problems of human development during the past ten years. It is possible to mention only a few of the important contributions that have been made.

I. *Genetics*.—Important genetical studies have shown that marked alterations of metabolism may occur concomitantly with mental defect and that the occurrence of these alterations in metabolism follows along genetically determined lines. The essential inborn error of metabolism lies in the failure of the body to oxidize phenylpyruvic acid. As a result, the entire organism suffers a marked arrest in development despite the fact that in most cases the stature and gross physical development appear to be normal. Similar arrests in the metabolism of fats have been found, as in the failure of the body to oxidize the diaminiophosphatide-sphingomyelin. This failure results in the clinical syndrome of family amaurotic idiocy. A third type of arrest in metabolism is seen in the basal ganglia degenerations of the Wilson and Westphall, Strümpell, Hallevorden-Spatz diseases. Increased copper and silver content of the viscera and widespread disturbances in pigment distribution and in constitution may be found in these basal ganglia degenerations. Satisfactory studies on the incidence of these diseases show that each of the three general conditions mentioned is determined by an autosomal recessive gene substitution. Arrests in carbohydrate metabolism have been noted in the condition known as glycogenosis in which the glycogen is not generally broken down but stored in the various viscera. Other disorders of metabolism in cer-

tain percentages of mental defectives may be seen in albinism (which chemically may be related to phenylpyruvic oligophrenia) and also in muscular dystrophy.

The importance of making use of carefully studied neurological material to analyze mendelian recessive and dominant characters appearing in mental deficiency has been demonstrated, for example, in the study of symmetrical congenital cerebral palsies. The study of identical twins is of growing importance.

II. *Auxology*.—Auxology, which means the study of biological aspects of growth in contrast to psychological aspects, includes biochemical, physiological and physical anthropological fields. Endocrinology plays one of the most important roles in the field of mental deficiency. Any combination in endocrine pathology may be found. Of special note is recent work in the endocrinology of mongolism. It has been demonstrated in mongoloid children that between birth and two years there is a striking deficiency in pituitary and associated hormone factors. Morphological studies on the mongols have clearly indicated slowing-down processes with the retention of fetal characteristics of the skull, and a general hypoplastic growth condition. "Typical of the condition is the lack of basophiles during the first years and later a marked deficiency of basophiles. Basophiles and chief cells are replaced by acidophiles whose number appears increased." The anterior lobe of the pituitary may influence not only the architectural variations of the skull but also the central nervous system, and consequently, affect mental growth.

The ganglion cell disease of amaurotic idiocy is characterized by demineralization, that of tuberous sclerosis by hyper-mineralization of the cytoplasm. This aligns amaurotic idiocy with other degenerative conditions and tuberous sclerosis with disease conditions—blastomatous or neoplastic in nature. This reference to tuberous sclerosis supports the contention that tuberous sclerosis (which may be associated with a genetic mechanism) may be blastomatous or neoplastic in nature. Neuropathological studies on tuberous sclerosis indicate the presence of extensive sclerosing and atrophy, tumor formation, heterotopias, arrest in development of the convolutions, arrest in the growth differentiation of cells (arrest in the differentiation of the laminary migrations).

In anthropometric measurements of mongoloid idiots and imbeciles, the growth ratios of their various body segments correspond closely with those of infants and with those of lower anthropoid animals. Extensive measurements of defectives over a period of twenty years indicate the presence of developmental factors hitherto not clearly denoted.

Preliminary studies with electroencephalographic technique give indication that such technique may likely furnish a valuable tool in the study of physiological factors upon which intelligence and its deficiencies depend. It may also contribute to the analysis of certain growth factors involving organic and psychological correlates.

III. *NEUROLOGY*.—Extensive studies of birth trauma and illnesses of infancy show that these experiences in the lives of growing human subjects are important factors in the field of mental deficiency. The dangers of paranatal

asphyxia have been particularly stressed. Special factors in processes associated with parnatal asphyxia include: brain cell dehydration; gross pressure or laceration including edema, trauma, hemorrhage (producing anoxic areas); respiratory depressants including drugs, anaesthetics and toxins; prematurity and agenesis; strangulation through thymus enlargement or aspiration; influence of fever, hot weather, glandular disturbances and labor on oxygen intake; and congenital heart disease or failure of the heart. The importance of encephalitic processes in early infancy is receiving increased attention. Of particular clinical interest is the question of encephalitis in relation to convulsive states and mental deficiency. Three major types of Little's Disease which should be carefully distinguished from other palsies of birth and infancy, have been described.

IV. *Psychiatry*.—Very little research has been done in this field in relation to mental deficiency. However, preliminary investigations carried out point to the fact that a vast and almost totally unexplored field awaits the neuropsychiatrist. In this field may be found extraordinary opportunities for the study of so-called psychosomatic relationships and also for the further checking and extension of work in the field of constitutional medicine as that has been carried on by Kempf, Pende, DeGiovanni, Viola, Bichat, Kretschmer, Kraepelin, Draper and others. Of special importance to the neuropsychiatrist are relationships between and among the problems of mental deficiency, psychopathic states and psychoses.

DR. W. HORSLEY GANTT, (Director, the Pavlovian Laboratory, Phipps Psychiatric Clinic, the Johns Hopkins Hospital, Baltimore, Md.): In discussing the contributions of conditioned reflexes in the field of neuropsychiatry, the following outline is offered:

Extraneural and Intraneural Adaptations.—The conventional conditioned reflex adaptations have been made on the basis of stimulations falling on the external sense organs from the outer world, *i. e.*, adaptations to the external environment. Our recent studies have to do with stimulations arising within the organism, *e. e.*, adaptations to the internal environment of the body. These two series of adaptations are somewhat analogous to the pharmacology of drugs *vs.* the pharmacology of the body, based upon internal relations to stimulations arising within, *e. g.*, to acetylcholin.

The problem which led up to this was the study of the rôle of the periphery *vs.* that of the central nervous system. To make clear the steps I shall mention the units of the conventional conditioned reflex and unconditioned reflex arcs. In the former we have *any* external stimulus for any external sense organ connecting through a suprasegmental structure with the unconditioned reflex arc, implying a *specific* stimulus for an external receptor plus segmental center, (perhaps also suprasegmental) plus efferent nerve plus executor organ.

Intraneural Conditioned Reflex.—We have shown the predominating importance of the central portions *vs.* the peripheral portions of these arcs by successive eliminations as follows: *conditioned reflex*, elimination of the peripheral sense organ and afferent nerve; *unconditioned reflex*, elimination

of the afferent end, receptor organ and afferent nerve up to but not including the motor area of the cortex, elimination of the efferent end, nerve and executor organ. We can therefore conclude *that the suprasegmental structures alone are sufficient for the formation of the conditioned reflex, which may arise without external stimulation or external response.*

Methods.—The efferent end was eliminated by destruction of the motor nerves roots to the hindleg of a dog; the afferent ends, by stimulation of the spinal afferent tracts or the suprasegmental structures directly with faradic currents, using buried induction coils in chronic preparations.

Conversely, what kind of responses can be conditioned?

Briefly, those involving a central emotional state, usually, and suprasegmental structures. Examples: the salivation arising from peripherally acting drugs as pilocarpin cannot be conditioned while salivation of an emotional state as hunger and fear can be. Hyperglycemia originating from direct action of injected adrenalin cannot be conditioned while that of central emotional states can be (Katzenbogen, Loucks and Gantt). Heart rate changes accompanying central excitation and inhibition, while preliminary work indicates that the heart slowing by direct vagal stimulation cannot be conditioned. Similarly sexual reflexes arising from peripheral stimulation without central emotion are much more difficult to condition, if they can be at all, than those which are part of a central emotional state.

Intraneural compares with extraneural conditioning in speed of formation and ability for differentiation, even though there is no peripheral receptor. The body is thus in fine adjustment through the ability to form conditioned reflexes to its own internal environment as well as to the external environment.

BIOCHEMISTRY AND THE VITAMINS.

DR. EDWIN F. GILDEA, (Associate Professor of Psychiatry, Yale University Medical School, New Haven, Conn.): The remarkable developments in psychotherapeutic methods during the past fifty years and their undoubted effectiveness in treating many patients with psychoneurotic symptoms have led to the expectation that these methods could alleviate and even cure many other human ailments. Extensive and intensive attempts have been made to control the development of the major psychoses with these new methods. Although it is extremely difficult to assess the results of these efforts, it is becoming increasingly clear that little has been accomplished in the treatment or prevention of the major psychoses.

Consequently psychiatrists are turning again to biochemistry, physiology, and particularly to biophysics for aid in solving the problems of mental disorder. Unfortunately it is necessary to stress the generally recognized fact that psychiatrists know little of these disciplines. It is not surprising, therefore, that previous investigations with these methods have given conflicting results. Technical errors, failure to recognize limitations of methods or complicating conditions have all contributed to this confusion of findings. In addition, the symptomatic classification of mental disorders is so unsatisfactory, that many studies have been made on extremely heterogeneous groups of patients.

There is an increasing recognition of these difficulties and some progress has been made in trying to provide a juxtaposition of investigators skilled in chemistry and physics with equally able clinical psychiatrists. Although only a beginning has been made, in this combined chemical, clinical and physical approach, the results or recent investigations are promising.

The brilliant experiments of Schoenheimer and his co-workers at Columbia with deuterium tagged fatty acids and amino acids reveal continuous chemical changes in lipid and protein structures of the body that were formerly looked upon as relatively static and at times inert tissues. Furthermore, Wells has recently presented evidence derived from many sources indicating that even the fatty depots are active organs from the chemical point of view.

In the light of these observations, chemical analysis of the blood at suitable intervals probably yields more information with regard to the total metabolic state of the body than was formerly thought possible. Therefore, attempts to correlate blood chemistry with body build, capacity for work and predisposition to certain disease, etc., should give important information.

It is noteworthy that some progress already has been made in this direction. Talbott has shown that apparently healthy relatives of patients with gout have high levels of uric acid in their blood. Our own work has shown that people with pyknic body build have high blood serum cholesterol, phospholipids and fatty acids, while the leptosomes have low values. People with mixed or intermediate physiques have lipoids in between the two extremes. There also appears to be a correlation between a high capacity for work and high lipoids. More recently we have found that schizophrenic patients tend to have low blood lipoids as contrasted with the manic-depressives who have high values. Obviously it is important to know how these lipid levels are maintained and regulated. Some progress has been made in this direction but much remains to be learned.

The lipoids, however, constitute only one aspect of present day developments. The following examples represent but few of those that could be mentioned if time permitted:

The careful nitrogen balance studies of Gjissing revealed that catatonic schizophrenic patients retain nitrogen which is discharged when they recover. Further studies were delayed because there were no micromethods for measuring amino acids. Recently, however, Van Slyke and co-workers have developed such methods, and Gjissing's work can be pursued further.

The studies of the effects of anoxemia on brain metabolism and on human behavior have yielded important results. But it should be stressed that studies of energy metabolism are limited to the aerobic phases and consequently it now appears that the brain uses only oxygen and glucose. No one at present can determine the anaerobic brain metabolism. Yet it now seems probable that a considerable part of energy exchanges go on about the phosphorus molecule and may not involve changes in the total amount of oxygen. The recent review of some of the coenzyme literature by Baumann and Stare brings out this point. Further progress will come, however, only with improved methods for measuring the more labile forms of lipoids and their con-

nections with the important phosphorus molecules noted above. Such methods appear to be close to realization. Nims and Marshall, under Dusser de Barenne's guidance at Yale, have combined electro-chemical, electroencephalographic and blood chemical methods. In this way they have found chemical changes that cannot be accounted for by oxygen and glucose, and they should be able soon to demonstrate the source of these unexplained reactions.

Psychiatrists often become impatient with the pedestrian and apparently mysterious activities of the chemists. They neglect the fact that in just a few years the vitamins have been isolated and once obscure degenerative nervous system diseases now respond to treatment with these chemicals. Some of the coenzymes essential to nervous system activity have been isolated. Furthermore, they should also realize that lipoid substances which make up a large part of the brain closely resemble the active principles of the endocrine glands, and the interactions between these substances are probably more intimate and important than we can conceive of at present.

By laying so much stress on chemical developments, I do not intend to imply that our efforts in improving the clinical examination of patients should not be pursued. In fact these methods grievously need to be improved and supplemented with electrometric methods and an attempt made to correlate such examinations with the chemical observations.

It must be emphasized, however, that if progress is to be made in biochemical and physical methods of investigation and past errors avoided, a change will have to be made in part of our psychiatric staffs. It will be essential to train some investigators both in chemistry or physics as well as in psychiatry. As this is not always feasible and may result in investigators whose training and abilities are inadequate in one or both fields, skilled biochemists and physicists also should be employed to work in the laboratories which form part of the psychiatric clinics. On account of the special and unsuspected problems which arise in attempting to apply the methods which have been discovered in one field to problems in another, such a chemist or physicist must have some capacity for developing and modifying the techniques in his own field. In order to attract men of high caliber and to make possible their continued development, laboratory facilities similar to those for research in "pure" chemistry or physics must necessarily be provided. It will, of course, be essential to have such a group directed by a psychiatrist with a talent for investigation who can systematize and guide the work along fruitful lines.

DR. SOLOMON KATZENELBOGEN, (Director of Laboratories and Research, St. Elizabeth's Hospital, Washington, D. C.): The accomplishments resulting from the application of chemistry to medicine are too obvious to need further elaboration.

With regard to the contribution of biochemistry to neurology and psychiatry we are rather prone to take a pessimistic attitude. Yet, serological tests are essentially biochemical reactions; furthermore in certain neurological and psychotic conditions diagnosis, treatment and mode of action of the latter derive help from chemical analyses of body fluids.

Anoxemia has attracted particular attention in recent years. It has proven to be the common factor not only in insulin and metrazol shock therapies but also in sleep treatment. The common property of narcotics such as luminal, somnifene, evipane and chloretone as shown by Quastel is to inhibit the oxidation of carbohydrates by brain tissue. Because of the disorder in the carbohydrate metabolism patients under sleep treatment develop ketonuria. This condition which in many cases has been responsible for giving up the prolonged narcosis treatment can be overcome by giving insulin and glucose in combination with the narcotic.

Anoxemia caused by narcosis presents another interesting point, namely, mild narcosis produces mental reactions similar to those one sees in normal individuals under lowered oxygen tension and also in certain mental disorders. This appears to be the more significant as anoxemia may be caused not necessarily by lack of oxygen but also by certain conditions which make the brain unable to utilize the oxygen available for oxidative processes.

Our biochemical research in psychiatry has included: Study of experimental acidosis in blood and cerebrospinal fluid of animals and the effect of histamine on the alkali reserve in blood. These studies were suggested by observations of acid-base imbalance in patients and by the ketogenic treatment in epilepsy. Our experimental studies of sleep induced by barbituric acid compounds have shown consistent decrease of calcium in both blood and cerebrospinal fluid. The content of calcium in the hypothalamic region was found to be higher than in any other brain area. Calcium has also been shown to be decreased in experimental catatonia induced by bulbocapnine.

In our conditioned reflex studies carried out in collaboration with Dr. Horsley Gantt we failed to condition adrenalin hyperglycemia and histamine gastric acidity, thus showing that conditioning cannot take place if the unconditioned stimuli exercise their specific actions essentially through the peripheral and not through the central nervous system.

Our interest in the function of the barrier between blood and cerebrospinal fluid led to studies of a great many chemical variables in various neurologic and psychiatric conditions.

Chemical studies in connection with shock therapies have shown that in insulin therapy not only anoxemia but also other changes in blood take place, such as decrease in urea nitrogen, amino acid and potassium. In metrazol therapy there are changes in CO_2 - O_2 equilibrium, decrease in blood of CO_2 combining power, of pH, chlorides and calcium; increase in sugar, lactic acid and inorganic phosphorus.

At the present time the biochemical division of our laboratory is engaged in studies of brain metabolism, namely analyses of carbohydrates, gases, minerals (diffusible and non-diffusible) and lipids.

We are planning in the very near future to begin studies of: (A) Tracing experiments of radio active elements. (B) Study of enzymes.

In concluding I should like to point out that if there is room for the pessimism I referred to in my introductory remarks, such pessimism appears justifiable with regard to interpretations made by various investigators who find it convenient to emphasize one or another chemical variable which suits

their theoretical speculations. For my part, for obvious reasons I am thoroughly convinced that biochemistry should be given a prominent place in research in neuropsychiatry, but in the present state of our knowledge we are still in the early phase of collecting data some of which, there is reasonable hope, will prove to be enlightening. There is a very serious difficulty, inherent in the nature of the subject, which every research worker in neuropsychiatry is confronted with. The difficulty is two-fold, first, there is the impossibility of provoking experimentally psychotic conditions, and second, diagnostic labels attached to psychotic and psychoneurotic conditions assumed to be similar not infrequently include actually a great variety of heterogeneous conditions, so that the biochemical data obtained from various sources in such "similar" pathological conditions actually very often refer to entirely different conditions. It is, therefore, imperative to carry out biochemical studies in each diagnostic group in as similar psychotic and psychoneurotic conditions as possible, and furthermore to describe comprehensively the condition in which the biochemical studies were obtained.

PSYCHOSOMATICS OR PSYCHOPHYSIOLOGY.

DR. JOHN C. WHITEHORN, (Professor of Psychiatry, Washington University, St. Louis, Mo.): In discussing present research trends in psychosomatic medicine, it must be pointed out that the prevailing conceptual formulation remains that of a psychophysical unit. That is to say, the detailed studies on physiological reactions and psychological trends have not been shaped up toward establishing parallelism between physical and psychic events in a one to one correlation, but rather as complementary data, all of which have to be combined into an integrated conception.

There has been a shift, it seems, toward the experimental method. The older publications were, in larger measure, based on anamnestic data. Tentative formulations were developed from detailed life histories concerning the influence of experiences of sickness upon the later organic expression of neurotic trends. The more recent research tendencies appear to be in the direction of close psychological scrutiny during periods of physiological change—spontaneously occurring or induced by endocrinological agents or other methods. Such studies seem to promise a firmer grasp, with the control of more variables in our hands.

SOCIOLOGY.

DR. ERNEST W. BURGESS, (Professor of Sociology, University of Chicago, Chicago, Ill.): The presentation of current trends in sociological research with some bearing on neuropsychiatric research will be limited to the fields of delinquency and mental disorders.

For American cities juvenile delinquency rates are highest in areas of physical deterioration and social disorganization around the central business district and regularly decline in each successive outward zone. This has been established by C. R. Shaw and H. D. McKay for Chicago, Birmingham,

Cleveland, Denver, Philadelphia, Richmond, Seattle, by C. Schmid for Minneapolis, by J. B. Maller for New York, and by other investigators for over twenty other cities.

Shaw and others find that urban areas with high delinquency rates thirty and forty years ago maintain these high rates despite changes in population by racial and nationality groups. Shaw in Chicago, corroborated by P. V. Young in Los Angeles, discovered that children of incoming groups into delinquency areas at first are non-delinquent and only as they are Americanized and accepted into gangs do they learn criminal patterns and techniques. Conversely, W. Healy, Shaw, J. Landesco and C. De Sylvester find that movement of families out of delinquent into non-delinquent areas favors the dropping of delinquent behavior by older children and the prevention of delinquent acts in younger children.

These differences in delinquency rates by urban neighborhoods can be explained by various causes including: (1) biological inferiority, as in intelligence, (2) economic conditions, as poverty, and (3) presence of criminal tradition. H. M. Adler and C. Murchison, S. Tulchin and others have shown that the proportion of inferior intelligence among criminals and delinquents in penal and correctional institutions is no higher than in the general population and that there are mental differences by types of crime, *e. g.*, forgers and confidence men have much higher than average intelligence. De Sylvester compared two communities with populations of same national origin and same economic status, one with a very high and the other with a very low rate of juvenile delinquency, and explains this difference on the basis of social disorganization and criminal tradition, as present in the delinquent community, and absent in the non-delinquent community. Shaw is assembling data to show the influence of criminal tradition and participation in the life of the gang to initiation and continuance in juvenile delinquency. In a monograph, *Brothers in Crime*, he reports that the youngest of five brothers was first arrested by the police in company with two of his older brothers while engaged in burglarizing a house at the age of three years and three months.

E. H. Sutherland, in his presidential address before the American Sociological Society, gave data indicating that "white collar" crime is prevalent in the business world and occasions as great or greater economic loss than crime by the underworld criminal, but is not as frequently punished, particularly by penal incarceration.

R. E. Faris and H. W. Dunham present findings for Chicago, correlated by studies for Providence (R. E. Faris), Kansas City (E. Manheim), Milwaukee (M. Reuss), and St. Louis (S. A. Queen), which show that the rates of all mental disorders taken together regularly decline, like delinquency rates, from the zone at the center to the zone at the periphery of the city. Equally significant is their finding of the differential decline by urban areas according to different psychoses. For example, manic-depressive psychoses have a rather random distribution with some tendency to concentration in apartment areas; paranoid schizophrenia cases are concentrated in homeless men and rooming house areas; and catatonic schizophrenia cases are bunched in areas of first immigrant settlement. The explanation of these dif-

ferences in distribution are not clear, although several theories have been suggested: community influences, especially isolation; internal migration, and differences in inherited neuropsychic constitution in urban areas. Dunham reports that pre-catatonics and pre-paranoids living in delinquency areas have a negligible rate of delinquency.

On the basis of his studies of juvenile delinquency C. R. Shaw, working under the auspices of the Illinois Institute for Juvenile Research and the Chicago Area Project, has been engaged since 1932 in a program of neighborhood organization for the treatment and prevention of juvenile delinquency. It is expected that this experimental program will determine the extent to which juvenile delinquency may be controlled by group therapy, by individual therapy and by a combination of group and individual therapy.

PSYCHOTHERAPY.

DR. HARRY BAKWIN, (Associate Professor of Pediatrics, New York University Medical College, New York, N. Y.): During recent years there has been a rapidly growing realization among pediatricians of the importance of psychologic care for the child. It may interest you to know that the *Journal of Pediatrics*, the official journal of the American Academy of Pediatrics, gives preferential publication to papers dealing with this subject.

A large part of pediatric practice is concerned with the care of the well child and the promotion of optimal health. In pediatrics, to a much greater extent than in any other branch of medical practice, the individual is looked upon as an integrated unit and the feelings, actions and thoughts of the child are as much the concern of the pediatrician as is his physical being.

The principles underlying the modern care of the child are simple and can be stated briefly. The child matures according to a plan and a sequence which are innate and which are not readily susceptible to environmental influences. Maturation implies the acquisition of new patterns of acting, feeling and thinking; it also implies the relinquishing of outgrown patterns. In practice this means that the child's emerging attributes must be understood if the greatest benefit is to be obtained from training and education. It is useless to train a child to a mode of behavior until he has matured to the stage where he is ready for such training. Indeed training procedures introduced prematurely are not only ineffective; they may be actually harmful, since they impose on the child—and parent—unnecessary strain. Nevertheless, attempts at accelerating the child's maturation are among the commonest errors in child rearing.

The unfolding of the psychologic maturation sequence, like the physical, is obligatory and not optional. If optimal health is to be attained the maturing child must have an outlet for his developing skills and feelings, and hence we speak of the psychologic needs of the child just as we speak of the nutritional needs.

In everyday pediatric practice there are numerous examples of children who are traumatized by lack of gratification of the psychologic needs. The

most striking clinical condition resulting from insufficient satisfaction of a psychologic need is seen in the so-called rejected child.

We should like to emphasize that gratifying the child's psychologic needs does not mean unlimited indulgence. Through training and discipline the child's maturing capabilities and emotions must be directed into useful and socially acceptable channels. Training implies positive encouragement and direction, whereas discipline implies restraint. Discipline is necessary in order to curb excessive emotional demands and to assist the child in outgrowing less mature modes of behavior.

Disturbances of behavior and feeling, then, result from attempts at accelerating or retarding the maturation process, from failure to gratify the child's needs or from overindulging the child's needs, and should be looked on as symptoms of improper parental care and training.

There is a widespread conviction that psychologic trauma is irreparable and that injuries sustained during infancy and early childhood permanently color the personality. Though this is probably true in some instances, it is an unwarranted generalization based mainly on the clinical observation of patients with severe psychologic trauma and psychiatric disease. The persons who are more or less permanently affected by improper training are those in whom the unfavorable treatment has continued to operate over long periods during childhood and even into adult life. If the situation is rectified soon enough, there is every reason to believe that the effect on the personality will be without serious consequences in the large majority of instances.

DR. PAUL SCHILDER, (Professor of Research Psychiatry, New York University Medical College, New York City): Psychotherapy should be studied and taught as a unified science. At the present time the tendency prevails to split it up. There is the psychobiologic group; there are the psychoanalytic groups. After the secessions of Jung, Adler and Rank the psychoanalytic group has retained some outward coherence. However, the teachings of Horney, Rado and Kardiner seem to diverge very widely from the teachings of Freud and the group which has retained his basic beliefs. Melanie Klein and Jones have also stressed divergent points without deviating as far as the authors previously mentioned. To be sure, it is unavoidable and even necessary that disagreements exist in a science which is growing. However the final goal is unity and the psychoanalytic groups have all too often the tendency to stress the differences, to create schools with the claim of particular originality. This is only possible when a small part of the total problem is unduly stressed. Some authors, for instance, stress the sociological and cultural aspect and neglect the biological aspect. The opposite may occur too. Psychoanalysis as a whole has had for a long time the tendency to keep separated from medicine. Psychobiology has never clearly stated its various dependencies. Child psychiatrists have their own varieties of therapies; relationship therapy, attitude therapy, release therapy, etc. The disagreements become bitter when theories and dogmas become codified and institutionalized and lose their flexibility. It is advisable that every part of the therapeutic armamentarium should be tested again and again by clinical observa-

tion. We still need clinical statistics of the symptomatology of neuroses as well as of the results of treatment. Hinsie and Ross have made successful beginnings.

We need an evaluation of the area of agreement between the different psychotherapies. The symposium held at the meeting of the Orthopsychiatric Society on this topic is of fundamental importance. There seems to be not much doubt that we have to study the personality of the neurotic and his conflicts. These conflicts are not only in the present but belong also to the past. Different authors put merely different stress on the evaluation of childhood and present-day experiences. There is furthermore agreement that the patient himself does not have insight into his problems but he is expected to work them out in cooperation with the physician. Therefore, the patient's relation to the physician is justly considered by almost all schools of psychotherapy, as of fundamental importance. Some authors even stress attitudes more than they stress insight. The formulation of the problem of the unconscious may vary in different authors. However, we have learned that our knowledge of our own experiences is limited. The rôle of symbolism in the symptomatology and etiology of neurosis cannot be doubted. The importance of sexuality is not controversial. However, there is a wide divergence of opinion concerning the extent in which these sexual factors are operative in neurosis. These problems can be studied clinically and experimentally. Not enough good case histories are published. The animal experimentations on conditioned reflexes (which should be called experiments on habit formations) should be reformulated so that they have closer relations to the fundamental problems of neurosis. Liddell has made a beginning in this respect.

The relation between experimental psychology and psychotherapy is not sufficiently close. The experiments and formulations of Lewin have relations to psychotherapeutic problems but do not give sufficient attention to the bulk of psychoanalytic experience.

There is a striking lack of studies of ideologies which play such an important part in the genesis of neuroses. We do not know the unformulated ideas of the total population in relation to such important problems as masculinity, femininity, sex, perversion, religion, war, strength, beauty, just to name a few. These problems should be studied in detail. We need Gallup polls on ideological subjects.

The possibilities of group psychotherapy are not sufficiently studied. A concerted effort should be made in the fields common to psychotherapy, education and penology. We do not know whether group psychotherapy could be made valuable for prisons and schools. The field of psychotherapy of organic diseases should be not only restudied with a better methodology than that used so far, but should be also enlarged by group treatment.

Psychotherapy has never received sufficient help. Psychoanalysis has the great advantage to have created a real school with a systematized training. We should be grateful for it. The teachings of the psychoanalytic schools are however necessarily one-sided. Didactic analysis carries with it the danger of proselitism and of perpetuation of individual idiosyncracies. Unfortunately, the psychoanalytic schools generally do not command a sufficient amount of

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clinical material. The places which have clinical material do not care to offer a systematized training in psychotherapy. There is a definite need for schools of psychotherapy in connection with large hospitals. Such schools should not only help with the undergraduate teaching in psychotherapy and give to the student a better opportunity for doing psychotherapy under guidance than he has at the present time in most medical schools; but should also provide for definite post graduate training and teaching in psychotherapy—a definite curriculum of three or four years should be offered.

CLINICAL PSYCHIATRY.

DR. D. EWEN CAMERON, (Professor of Neurology and Psychiatry, Albany Medical College, Albany, N. Y.): Research in the Ageing Process with Special References to Human Behavior: The work which has already been carried out in this field is somewhat limited. Hitherto the majority of the contributions have been made by workers from other fields. There have been extensive contributions concerning the rate of oxygen consumption as correlated with age, and it has been demonstrated that there is a very considerable fall in utilization of oxygen at the higher age levels. The fluid content of tissues has also been considered—in general, it may be said that this becomes progressively less with age.

A problem which in the past has exerted considerable interest is the relationship of sexual activity to age. In the nineteenth century there was a fairly widely held belief to the effect that an active sexuality was associated with probable longevity. Recent animal experimentation has not tended to support this.

Another contribution of possible importance for the human subject is the discovery that reduction in the caloric intake during the earlier years of life in animals tends to increase considerably the duration of life for these animals.

The outstanding work on behavior has been carried out by Miles and his group who have made studies of the higher level activities of aged individuals. In general, it may be said that in the older individuals there is fairly early loss in the speed with which activities can be carried out, together with a much better preservation of "power." This statement is to be qualified, however, by the observation that activities which represent new departures for the aged individual are not particularly well carried out.

There are some studies on the use of language and also on the nature of thinking. In general, it is reported that the aged individual has more difficulty in making use of abstractions.

Our own work has been prosecuted in three fields. The first is purely investigative. We have been especially interested in the utilization of oxygen in the aged since it is clear that many of the symptoms shown by old persons are similar to those shown by individuals who have been exposed to low oxygen tensions over extended periods of time. We have found that, while the difference between the arterial and venous oxygen content of the blood going to and coming from the brain is not abnormal, the arm to carotid

circulation time is very considerably lengthened, and for this reason it seems possible that less oxygen is being taken up by the brain from the blood stream than is normal. We have also found some indication that not only is the oxygen combining power of the blood low, but the capacity of the blood to pass through the barriers between the lung alveoli and the pulmonary capillaries is reduced. We have also been considerably interested in the ability of the cardio-vascular system to adjust itself to changes in pressure and have found that the compensatory changes present in the normal are much interfered with in people in later life. Similarly, we have found that the ability of intracranial vessels in the aged to respond to such vasodilators as histamine is very much reduced.

We have also been interested in the question of memory in aged persons and have found that there is not only very marked increase in preservation, but there is also a great acceleration in the speed of secondary elaboration, so that experiences once registered very rapidly became distorted.

Our second main field of interest is the establishment of a clinic for aged persons suffering from behavioral disorders. So far, this has found its main value as a means of keeping in touch with older persons who have been discharged from the psychiatric division, but we are hopeful that we shall be able to offer facilities for individuals who are showing incipient signs of mental breakdown. Finally, we have established through the cooperation of the Albany Council of Social Agencies a series of social clubs for old persons. It has been our experience that a very considerable number of older persons who finally break down and come to the psychiatric department have suffered seriously from a lack of social integration. A remarkably high percentage of old persons drawing old age relief actually live alone. Others are unhappily located in the homes of younger persons. Our objective has been to provide means for these older persons to get together and develop a new sense of social unity. We have found already that there are considerable reserves of leadership and constructive thinking in these old persons, and we are hopeful that providing an outlet for this leadership and constructive thinking will tend to exert a stabilizing effect.

These two latter fields of activity have been described, although they cannot at present be considered as purely research activities, as settings necessary to provide laboratories for future research.

DR. WILLIAM MALAMUD (Director of Clinical Psychiatry, Worcester State Hospital, Worcester, Mass.): In a discussion of this type by a large number of representatives of different branches of neuro-psychiatric research, one must refrain from going into details and be satisfied with the indication of a few specific trends. I should like to limit myself to the following outstanding aspects of research:

(1) *Experimental Investigations.*—The experimental reproduction of behavior disturbances under controlled situations has helped us gain insight into the possible etiology of such manifestations as we see them in clinical work. Dr. Gantt has already referred to the work in experimental neuroses as started first by Pavlov and enriched by contributions from the laboratories of Liddell, Maier, Dworkin and Gantt himself. Related to these are the ani-

mal experiments with drugs (DeJong) or anatomical studies (Ranson, Ingram and others), also studies of the effects of intoxicating drugs with the production of psychopathological changes (Berringer, Bleckwen, Lindemann and Malamud), and the work in psychological laboratories particularly in the field of topological psychology as reported by Levin, Murray and others.

(2) *Correlation of Neurophysiological and Clinical Observations.*—Here we have investigations into the relationship of demonstrable and measurable physiological disturbances to certain associated clinical manifestations. The more recent work in contradistinction to the psychophysiological parallelism of the Fechner School regards these not as separate entities running side by side, but expressions of disturbances in the psychophysiological unity of the individual that lend themselves to this method of demonstration. We might mention here the work in electro-physiology, stressing particularly the studies in chronaxy and electro-encephalography. We must also emphasize the work of the endocrinologists and neurophysiologists (Hoskins, Angyal, Freeman and others) who have demonstrated certain physiological changes that seem to be grossly related to disturbances in behavior.

(3) *Clarification of Concepts used in Clinical Work.*—Here we must emphasize studies of the course and outcome of behavior disturbances in relationship to certain methods of treatment. A great deal of impetus was given to this work by the introduction of newer methods of treatment, particularly in schizophrenia. The attempt to establish criteria of prognosis and of uniformity of the concepts of disease entities has helped materially in placing our clinical work on a more systematized level. The work of Ross, Cheney, Ebaugh, Malamud, Kant and others in the field of schizophrenia and that of T. A. Ross, Fenichel, Alexander, Malamud, Mapother and others in the psychoneuroses are but a few examples of the valuable contributions in this field.

DR. NOLAN D. C. LEWIS, (Director, New York State Psychiatric Institute, New York City): Actually to learn about mental disease one should attempt to understand the alterations in structure and in function which are exhibited by the individual in his various parts and also by the individual himself in his function as a totality during life. The data obtained by studying an individual during life must be subjected to critical analysis in the light of whatever background of modern knowledge we have. All the available and suitable methods for collecting data must be brought in to the picture. This should constitute the science of psychiatry. For those who object to the use of the word "science" in connection with clinical psychiatry, I would reply that if we have no science of clinical psychiatry it is high time we developed one and we should be very appreciative of any suggestions toward this end. Such disciplines as histology, cytology, immunology, endocrinology, radiology, electrochemistry and electrophysiology, among a number of others, represent expansions at the periphery of the body of present day scientific knowledge and are already being applied here and there in the field of psychiatry, however without this field being as yet carefully delineated clinically.

We are in dire need of objective clinical research as such to prepare the ground better for the utilization of our supportive sciences. It is a weak link which should be recast and strengthened to become a powerful unit in the hands of those teaching and practising psychiatry in this country. The knowledge gained and classified from a comprehensive study of a multitude and variety of observable reactions should give us a standard of comparison which would indicate the lines of greatest probability to follow in our various types of analyses.

Those who are inclined to see little value in ordinary clinical research should stop and consider the words of G. Stanley Hall: "There will always remain a wide domain of problems that we can only solve by watching, recording and tabulating the great age-old and world-wide experiments Nature has always made and will continue to make, wherein control disturbs the conditions of normal happenings and where we can only observe and interpret data which we had no hand in making, but which are given to us."

From a strictly clinical psychiatric standpoint, it is possible to divide the field for research into five parts keeping in mind that the lines of separation are not sharp as is always the case when delineations of biological phenomena are attempted:

1. Research on the differential characteristics of fully developed psychoses in adults for the purpose of reaching a solid, fundamental, descriptive ground which can prove itself and finally constitute the consensus of the majority of psychiatrists. In addition, to investigate the natural history of the development of mental disorders special studies on the mechanisms of hallucinations and of delusional formations are always of value. Researches aimed toward the clearer differentiation of clinical manifestations are now under way at the Phipps Psychiatric Clinic in Baltimore, at the Boston Psychopathic Hospital and at the Neuropsychiatric Clinic, University of Michigan.
2. Research on mental patterns which are deeper than or outside of those surface expressions which are not available for direct observation and descriptive accounts. These types of investigations into the subconscious, instinctive and dynamic factors must be better understood and brought out for evaluation in terms of their influence on total life situations.
3. Research on the behavior distortions and emotional deviations in young children during the early home and school adjustments. Detailed information on these problems may serve not only as definite aids in any mental difficulties in later life, but also as prognostic criteria when sufficient data and experience justify their practical utilization. Present researches of Dr. Charles Bradley of Providence, R. I., and those of Drs. J. D. M. Griffin and William Line of Toronto, Canada, are splendid examples of such efforts.
4. Researches into the primary or first exhibited activity of newly born infants where under specially arranged conditions comparative studies can be made on the early sucking, breathing, circulatory and general motor reactions. Differences and particularly outstanding peculiarities in the reflex and early conditioned behavior are undoubtedly important and lend themselves favorably to those follow-up studies which are necessary for any final pro-

nouncements as to their significance. Some outstanding research of this character is now being done by Dr. Margaret Ribble of New York, and a few others.

5. Research on the influence of cultures and types of society on the incidence, development and clinical expression of mental disorders. These studies should be made at once before the more primitive societies have been contaminated by the modern, social habits and ways of life. It remains to be determined whether the classical, so-called "functional psychoses" appear among the most primitive or belated peoples. Matters of incidence, frequency and types are still open for research and might afford invaluable clues for practical procedures. Among those workers who have recently made important contributions to the subject of comparative behavior are Dr. Ruth Benedict of Columbia University and Dr. Margaret Mead of the American Museum of Natural History.

Thus a great deal remains to be accomplished in the clinical phases of psychiatry where we may expect aid from the laboratory sciences in differentiating the reaction types. The drug therapies which have recently been brought to bear more actively in this field should also aid in this respect.

Before closing this brief statement of the situation, I should like to emphasize the obvious value of the now popular and extensive twin studies under way in a number of centers. Studies on the anatomical, physiological, pathological and psychological characteristics of monozygotic and dizygotic twins including their parents, siblings and other relatives, according to the method followed by Dr. Franz Kallmann at the New York State Psychiatric Institute and Hospital, should do much to throw both constitution and social components into relief and indicate their special rôles in the total results.

PUBLIC HEALTH VIEWPOINT OF RESEARCH IN NEUROPSYCHIATRY.

DR. GEORGE S. STEVENSON, (Medical Director, National Committee for Mental Hygiene, New York City): There are three trends I think important. First there seems to be a slight tendency to renew interest in multiple causations, after a period in which many persons have tended to follow single tracks. The pursuit of these single tracks has been productive scientifically, but sometimes constricting educationally. The broader approach confronts us with a greater choice of opportunity in both treatment and provision, since it gives us a choice of factors that may be attacked, any one of which may be a last straw.

Second, I believe there is an inclination to move away from a lesion centered orientation to a person centered orientation. Under the former the arteriosclerotic, senile and mental defective were hopeless since the lesion could not be repaired. However, as the centering of attention turns to the person and to the recognition that a psychosis is an expression of the behavior of the person and is not a lesion, we can see cure and arrest of these disorders as the social adjustment of the person improves. Thus careful regimentation of the senile and arteriosclerotic with the removal of pressure and

confusing elements may allow the psychoses to pass even though the lesion remains. The same is true of the mental defective that careful training makes it possible for him to become self-supporting. This same principle actually carries over into the field of public health, where there is greater inclination, for example in the field of venereal diseases, to see the disorders as a product not only of a microscopic organism but of sensitivities and demands of the person.

The third trend is toward a greater recognition of and provision for the interpersonal elements. Both in the understanding of problems and in making provision for their treatment.

DR. ABRAHAM MYERSON, (Director of Research, Boston State Hospital, Boston, Mass.): If we assume, as we must, on the basis of our present knowledge, that there is a decisive hereditary factor in the genesis of manic-depressive psychosis, schizophrenia, much of feeble-mindedness, and to some extent in epilepsy, then a research parallel to the quest for the cure of these conditions, which has for the first time some promise of fulfillment, is the detection of the hereditary mechanisms so that we may prevent these diseases. Otherwise, our cures will do harm to the race, and we will have furnished another indictment of science for those who are beginning to look upon it as the arch enemy of real human welfare.

Past research into the heredity of mental diseases has contented itself with a sort of historical compilation of the fate of the members of families. This is superficial work, no matter how carefully carried out. Moreover, there is so much concealment, in addition to ignorance of family history even in those cases where pride and prestige have created genealogies, that the statistics reveal little more than hints of the actual situation in any group. A recent and yet unpublished study of "great" families shows that the term *family history negative* is without meaning, and it is quite probable, if one spreads the term family to include second cousins and great-uncles and aunts, that no family is without mental disease. Family studies especially suffer in validity because the life span of any investigator is too short to permit him personally to watch the careers of his subjects for any significant length of time. A thousand fruit-fly generations, 50 generations of guinea-pigs may unfold themselves in the period of maturity of a scientist, but he cannot, alas, outlive generations of the psychotic.

Even if we limit ourselves to the biographical aspects of heredity, it will be necessary to establish an institute which will have a continuous life for generations, so that successive and yet collaborative groups of workers will follow the stream of human materials for enough generations to reach adequate and substantial conclusions.

But there is a more cogent and more scientific approach to the problems of heredity. We cannot rest with the word heredity; we must relate this to mechanisms and I mean organic or disturbed physiologic mechanisms, for no hereditary transmissions can be based on psychological events. In other words, the basic disorder of function or structure must first be isolated and then the family groups studied, much as William Washington Graves studied

the scaphoid scapula, before any real knowledge of heredity can be won and used. A hint of this also appears in the study of the brain waves, and the similarities between the electroencephalographic records of siblings, collaterals and the successive generations may well point the way to a real eugenics.

A clue to this kind of heredity study appears in the cases of those types of feeble-mindedness which depend upon a deficient carbohydrate metabolism with the result that pyruvic acid appears in the urine. The heredity of Tay-Sachs' disease becomes by recent research familial, indeed, but is traced down to a fat metabolism deficiency.

We need much more of this kind of science before we can really eliminate abnormal stocks. We cannot rest until we do build up a scientific physiology and pathology of the psychoses and neuroses. Otherwise, the cures we may bring about in the course of the next twenty-five years will merely add more cases to treat in the enlarging hospitals of each generation.

DR. BERNARD SACHS, (Director of Child Neurology Research, The Friedsam Foundation, New York City): In view of much that has been said here this evening, it is evident that active neuro-psychiatric research is the order of the day. As a matter of fact, we are entering upon a new era, an era in which, without discarding or neglecting purely clinical studies, or histopathological work, we are confronted with the possibility of solving pressing problems by entirely new electrical and chemical methods. These newer methods have already revealed so much of startling interest that greatest care must be taken not to draw hasty conclusions which might impede further research.

We are not yet justified, for instance, in concluding that epilepsy is due to development of abnormal rhythms in the cerebral cortex—cerebral dysrhythmia. No doubt such paroxysmal dysrhythmia is an important factor, but epilepsy is much more than merely that. As in so many other fields, the greatest need in all research work is to limit research whenever practicable to definite problems and such problems stem from the clinic; to develop thoroughly dependable methods of investigation. During the last few years, I have enjoyed the privilege as Director of Child Neurology Research to know how much fine research work is going on throughout the country. On the other hand, much time and effort are wasted because so many workers have not been able to pin themselves down to definite tasks and to do a lot of hard thinking before starting upon special research problems.

For years it was our ambition to reveal the pathological anatomical substratum of mental disease—without marked success. Our methods of research were after all inadequate. In the meantime, electrical and chemical research has given us further insight into brain activity. In adhering to the newer methods we cannot afford to discard the old. Careful histopathological studies, for instance, have revealed the effect of radiation applied to the cerebrum, upon the ganglion cells of the cerebellum.

The advances in neuropsychiatric research are well exemplified by the present day interest in amaurotic family idiocy—known as Tay-Sachs disease. As I pointed out in the address read for me at the Third International

Neurological Congress at Copenhagen in August 1939, this disease, first described by me now fifty-three years ago, for over forty years excited considerable interest because of its well defined clinical and pathological features; during the last decade, it has attracted far greater notice than ever, because the disease is now known to be an expression of faulty fat metabolism, bearing a close resemblance to what happens in Niemann-Pick Disease. I cannot go into details; but fat metabolism is holding the center of the stage and as I said a year ago, the only question of prime importance is—How can we account for this abnormal fat metabolism as a family fault, do the endocrines play a significant rôle? And once we have even a suspicion to what it is due, let us apply our thought and knowledge to the possible cure or amelioration of these conditions. The thought that family and many so-called hereditary conditions may be checked if not cured has rekindled my therapeutic optimism and will, I hope, defeat the pessimism of many of my younger friends.

May I add this encouraging note, that neuropsychiatric therapy even decades ago showed a most satisfactory awakening. Is it not a fact that we see far less of general paresis and of tabes dorsalis than we saw years ago; dementia præcox and manic-depressive psychosis are far less troublesome than they were, and now shock therapy and sleeping treatments promise still more for the future. It must be a great satisfaction to us all to realize that these newest research methods (chemical and electrical) will not only clarify our thoughts as to brain activity but will also do much to improve psychiatric therapy of the future. Thank Fortune, instead of years of treatment, months of treatment may be sufficient. But all this work must be done under most careful supervision and by men and women well grounded in organic neuropsychiatry, and thoroughly familiar with the latest electrical and chemical methods. It augurs well for the future that this important work may be done under the guidance and control of a carefully appointed National Health Committee, who will secure proper cooperation between the neuropsychiatrist, the endocrinologist and the biochemist.

DR. LAWRENCE KOLB, (Assistant Surgeon General, United States Public Health Service, in charge of the Division of Mental Hygiene, Washington, D. C.): Public health officers have up to very recently paid no attention to mental health. If they approached the problem at all it was with the fatalistic attitude that mental disease is hereditary and inevitable in certain individuals and nothing can be done about it. They have been occupied with infections, industrial hygiene and all other types of hygiene except mental hygiene. But a gradual change has taken place and some health officers are now beginning to realize that the mind is a part of the body, that it may be influenced by social, personal and physical factors and that after all the public health officer does have a function in the mental hygiene field. The situation as to public health is complicated by the different administrative setups for dealing with mental disease, but there has been some progress and there will be more. We have progressed from the jail to the asylum, from the asylum to the hospital, and we now must make the hospital an intricate part of the

public health system, either by incorporating it with public health departments or by working out a plan of close coordination between the health officers and the welfare officers or other administrative officers who have to do with the mentally diseased.

In line with this general trend, the Public Health Service has for several years been making a study of methods that may be applied by public health departments to mental health problems. This has borne fruit and in Kentucky, where study has been made, a Bureau of Mental Health has been set up in the Health Department by the aid of a unit consisting of a psychiatrist, a psychologist and public health nurses who are being trained in mental hygiene. An intensive demonstration program has been put on in several counties and a less intensive program is being arranged for other counties. This program envisions the education of all health officers and all county public health nurses in mental hygiene matters so that they can help the so-called nervous cases just as they now help cases of tuberculosis and other diseases. Statistics on mental disease in the general population are being collected and a close working arrangement has been made with the Welfare Department so that the Health and Welfare Departments will each know what the other is doing and will be mutually helpful. It is hoped that eventually there will be psychiatric clinics radiating, at least at first, from the mental hospitals and meeting at various times in strategic places where cases of mental ill health may be referred for advice and appropriate disposition. Social workers will, of course, have a large duty in this field.

The Federal Government, through the Public Health Service, is now giving \$11,000,000.00 per year to the States to promote public health. There is no reason why some of this money should not be devoted to the preservation of mental health. In line with this idea, an officer of the Service, already trained in mental hygiene, has taken an extensive course in public health methods. He will begin this year to try to sell mental hygiene to state health departments so that these departments, I think, should establish a Federal Neuropsychiatric Institute for the study of nervous and mental diseases and epilepsy. I have advocated this for several years and it has received widespread approval. This institute should have a central unit for studying fundamental problems that may have a bearing on nervous and mental diseases. It should include physiology, biology, biochemistry, endocrinology, pathology, laboratory types of psychology, etc., and field studies of mental disease and mental health problems. Just as important as the work of the central unit would be the provision of financial aid by the institute to competent units working at universities, hospitals and clinics, the entire program to be supervised and coordinated by an advisory neuropsychiatric council made up of distinguished scientists from the various fields whose problems have a bearing on mental health. We feel that in its present troubled state the world looks to the United States for research and to things that are worth while, and we of this organization should accept the duty and the challenge for the field of mental hygiene.

DR. ADOLF MEYER, (Professor of Psychiatry, Johns Hopkins University, Baltimore, Md.): I have been asked to read into the record of this round

table some recommendation of resolutions to the effect of promoting research in the field of psychiatry along lines which have precedents in the federal provisions in problems of cancer and other hazards to health.

Listening to the discussions, I felt like measuring the statements in the light of the search for the facts and methods called for in the daily needs and services of our hospitals and practices, and in the light of those urges and ambitions that spring from the visions of suggestion and opportunity arising in the realm of theory as well as practical challenges. Moreover, we have reasons to think of the advances actually on record and of the often unpredictable ways they actually came into being. Evidently we want opportunities and furtherance of talent and some of that leisure for thought and digestion of experience and examples of work and progress, and affiliations with research centers of the most varied kinds. Many advances look more like happy or lucky ventures than much premeditation. But they too should become more readily tried out and made promptly accessible than with mere haphazard *laissez faire*. It is a question of how much real progress comes out of prepaid assistance. Whatever will serve as example of ordinary sound work and search will also breed research. It is for this that we advocate promotion or organizations that do have the provisions and intentions of well rounded planning and execution, and in this sense a central institute will be able to help specially favored and capable staffs in keeping the heads above the waters of the bare necessities with which most of the workers have to struggle. Foresight calls for an institute that will be able to go into the territories that offer the best data and producers of fruit and in a position to reach those fields with armament that cannot readily be duplicated. It may well become an incentive for a much needed sense of public obligation to be more thoughtful throughout the state systems in the direction not only of improving the absolutely necessary work with the mentally sick and invalided, but to do much more towards what sickness teaches the healthy to heed and to treasure and promote.

The following is the draft put before you for comment, discussion and consideration and, we hope, adoption:

WHEREAS the Surgeon General of the United States Public Health Service in his Annual Report for 1939 stated that "Mental and nervous diseases and epilepsy together represent the largest unsolved problem in medicine. Hospitals caring for mental disease have on their books more than 500,000 patients, and more than 117,000 additional patients are cared for in hospitals for mental defectives and epileptics. These figures represent only an undetermined fraction of the total problem of mental and nervous diseases and epilepsy. Millions of dollars are spent each year for the care and treatment of such patients; but very little is expended for fundamental research which might lead to a measureable control of the problem and cure." In order to remedy this condition the Surgeon General recommended the establishment in the Public Health Service of an institute for the study of these diseases. Therefore be it

Resolved, That The American Psychiatric Association appreciates the enormity of this problem and deplors the paucity of research efforts directed toward the solution of it. The treatment of patients in mental hospitals alone casts various governmental agencies approximately \$230,000,000 per year, and yet scarcely one per cent of this fund is devoted to research that might eventually lead to an appreciable reduction of the financial burden and the relief of many individuals and families of suffering and distress.

The American Psychiatric Association therefore recommends that a central Neuropsychiatric Institute be established in the Public Health Service to carry on research in nervous and mental diseases: that this institute also have at its disposal funds to be allotted to competent groups throughout the country approved by a National Neuropsychiatric Advisory Council to carry on research projects in these diseases.*

CLOSING REMARKS BY DR. S. BERNARD WORTIS: It is apparent from the discussion this evening that research in neuropsychiatry is advancing on a broad base. Our agenda has outlined the more important trends in anatomy, biochemistry, electrophysiology, psychosomatics, psychotherapy and clinical psychiatry. In the field of genetics it is important to note that specific alterations in metabolism occur concomitantly with mental defects along genetically determined lines. We have heard of the contributions from the field of the conditioned reflex studies in producing experimental neuroses.

Biochemical studies of the neuroses and psychoses have yielded many valuable data, but this field remains practically untouched. Unfortunately, neuropsychiatrists know too little of the disciplines of biochemistry, biophysics and physiology.

In the field of psychosomatics, happily, there has been a shift toward the experimental method in which complementary psychobiologic data are subjected to careful study. This is a step of progress beyond the earlier simple collection of anamnestic material.

It becomes more apparent each year that the neuropsychiatrist has much to learn from the anthropologist and the sociologist.

The pediatricians, who see more children than the neuropsychiatrist, emphasize that most psychological traumata are reparable and without serious consequence.

*The resolution offered by Dr. Adolf Meyer was unanimously passed by the meeting and forwarded to the Council of The American Psychiatric Association for appropriate action.

The contributors have emphasized many directions to which neuropsychiatric research should be turned. Some of these may be itemized as follows:

1. Genetics and heredity must be attacked by newer biochemical methods. We must not rest satisfied with the older statistical methods.

2. Studies are needed in the relationship of endocrinologic dysfunction to the production or cure of nervous and mental disease.

3. Studies in brain metabolism, especially the anaerobic brain metabolism, are practically non-existent. Brain chemistry is a virgin field.

4. The pharmacologic effects of drugs should be further studied to include the psychologic effects, as well. Pharmacology is a neglected basic science in our medical colleges.

5. Neuropsychiatrists need to be not only psychologically trained, but should be better oriented in the basic sciences.

6. Conversely, internists and pediatricians need a psychologic orientation.

7. In the field of psychotherapy there is need for post-graduate schools to teach and test the various psychotherapeutic methods. Such schools should be established under university aegis. More experience is needed with group psychotherapy as an effective and practical curative method.

8. There is great need for the coordination of research data. We must be willing and able to integrate the methods of special laboratory techniques and, furthermore, must create our own special clinical psychiatric methods. We must further develop the *science of clinical psychiatry*.

9. There is need for research in the natural history of mental disorders.

10. In order to help build up a scientific and correlated psychology, physiology and pathology of the psychoses and neuroses, there is an urgent need for neuropsychiatric research to be carried out by a Federal Public Health Agency. The national scope and continuity of such Federal Public Health Agency would make long term coordinated research projects possible.

We are happily seeing a very healthy trend in neuropsychiatry and medicine wherein the physician is coming to study the whole of man.

REPORT OF PROGRESS IN DEVELOPING A MENTAL
HYGIENE COMPONENT OF A CITY
HEALTH DISTRICT.

By PAUL LEMKAU, CHRISTOPHER TIETZE

AND

MARCIA COOPER,

The Johns Hopkins University School of Hygiene and Public Health.

In 1936 Dr. Ruth E. Fairbank, then psychiatrist in charge of the Mental Hygiene Study* of the Eastern Health District in Baltimore, outlined the considerations which led to the establishment of the study and reported on the progress of the work.† She outlined a general program based on the following objectives:

1. To determine the presence of mental disease, defect and dysfunction in the district under consideration;
2. To discover, in as great detail as possible, the economic, social, racial and personal factors underlying these conditions;
3. To devise and put into experimental operation, as a part of the existing health service of the community, such administrative procedures as would seem to offer hope of effective management and prevention.

It is the purpose of this paper to discuss the progress which has been made in attaining these objectives, paying special attention to the last of the three.

The effort to reach objective 1 above, took the form of a survey of personality disorder in the Eastern Health District of Baltimore in the year 1933. A search was made in the records of psychiatric clinics, courts, social service organizations, state institu-

* The Mental Hygiene Study was set up as a research project supported by the Rockefeller Foundation in 1934. Its personnel includes a psychiatrist, whose duties are supervisory and clinical; a social worker, to gather data and work with the clinic patients in the carrying out of therapeutic suggestions; a medical statistician for the analysis of survey data; and a clerk. The psychiatrist has some teaching responsibilities in the School of Hygiene and Public Health of the Johns Hopkins University.

† Fairbank, Ruth E., Mental Hygiene Component of a City Health District. *Am. J. Pub. Health*, 27: 3, March, 1937.

tions, etc., for individuals who could be identified as living in the district in the year. In this way records which indicated that the individual would be of interest to our study were obtained for 7 per cent of the 57,000 individuals living in the district. These records were then studied, analyzed according to a scheme which suggested itself as the material was reviewed, and subjected to analysis by the punch card technique. The results of this work have been published in full in the *AMERICAN JOURNAL OF PSYCHIATRY* * and in *Human Biology*†, and in summary in the *American Journal of Public Health*. ‡

These studies showed that the prevalence of psychosis in the district was slightly higher than that observed in the general population of the United States, the prevalence being determined by methods based on the number of hospital admissions. This method of determining the prevalence of psychosis does not take into account cases which are not hospitalized during the period of observation. The material collected by the study in its 1933 survey makes possible for the first time for any locality in the United States the calculation of the prevalence rate of psychosis regardless of hospitalization. It was found that this latter prevalence rate was considerably higher than the former. As determined by hospitalization studies, the prevalence rate for psychosis in the Eastern Health District was 453.3 per 100,000; as determined on the more complete data collected by the study, the rate is 600.2 per 100,000. It will be noted that these data have profound significance in the conception of the problem presented by psychotic conditions generally, and have implications concerning the treat-

* Cohen, B. M., and Fairbank, R. E.: Statistical Contributions from the Mental Hygiene Study of the Eastern Health District of Baltimore. I. General Account of the 1933 Survey of the Eastern Health District. *Am. J. Psychiat.*, 94:1153, Mar., 1938. II. Psychosis in the Eastern Health District. *Am. J. Psychiat.*, 94:1379, May, 1938.

† Cohen, B. M., Fairbank, R. E., and Greene, Elizabeth: Statistical Contributions, etc. III. Personality Disorder in the Eastern Health District in 1933. *Human Biology*, 11:1, 113, Feb., 1939.

Cohen, B. M., Tietze, Christopher, and Greene, Elizabeth: Statistical Contributions, etc. IV. Further Studies on Personality Disorder in the Eastern Health District. *Human Biology*, 11:4, 486, Dec., 1939.

‡ Freeman, A. W., and Cohen, B. M.: Preliminary Observations on the Epidemiology of Mental Disease. *Am. J. Pub. Health*, 29:6, 633, June, 1939.

ment of the cases, for many must have been successfully managed in their own homes. To be sure, caution must be exercised in generalizing on the basis of these studies because of the relatively small number of cases and the fact that the population is entirely urban and of lower economic status; nevertheless, it has been effectively demonstrated that the prevalence of psychosis is considerably higher than previous statistics in this country have indicated.

Personality disorder, defined as recognizable inadequacy in capacity for personal and social adjustment of such kind as to indicate a need for psychiatric treatment, social agency case work or custodial care, was also studied as of the year 1933. We have been unable to find a survey which has presented data on this topic prior to this study. It was determined that 1310 of the inhabitants of the Eastern Health District presented personality disorder. In round figures, and again stressing the need for caution in making generalizations from a somewhat selected sample of 57,000 persons, this means that over two per cent of the population at large may present personality disorders of one sort or another which are recognized by the community as needing attention.

In the study of the distribution of the cases of all personality disorder (now including psychoses), certain interesting facts were discovered. The district consists of two contiguous city wards, nearly equal in density of population, economic standard and geographical configuration. The prevalence of personality disorder was significantly higher in the one ward than in the other, however, and this difference could not be explained on any ground yet examined. Studies made in the School of Hygiene suggest that syphilis and tuberculosis also have a higher rate of prevalence in the ward with the higher rate of personality disorder, though this study is yet incomplete. There is a somewhat higher rate of personality disorder among the whites in areas close to negro settlements.

The discovery of the facts noted above and others almost equally interesting led the study to undertake another survey, this time for the year 1936. The purpose of the second survey was to test the results of the first, to give indications as to the persistence of personality disorder and to give data concerning the influence of migrant families on the prevalence of personality disorder of all

kinds. The data of this survey are now in process of statistical analysis; reports of its findings will be published in full in 1940-41.

The third objective for the Mental Hygiene Study as set forth by Dr. Fairbank in 1936 concerned the devising and putting into experimental operation, as a part of the district health service, such administrative procedures as would seem to offer hope of effective management and prevention. Two services were established, first, psychiatric consultation free of charge was offered to the physicians practicing in the Eastern Health District, and, second, a mental hygiene consultation service was set up in one of the well baby clinics in the district.

The consultation service was made use of by the physicians increasingly until 1938 when, for a year, the study was without a psychiatrist to carry on the clinical side of the work. Since this unfortunate lapse of availability of service this project has not been reestablished in the same form, though it will be begun again on the basis of clinical contacts made in the well baby clinics.

The mental hygiene service for the well baby clinic was established in 1935 by Dr. Fairbank as a means of doing preventive work at the early ages at which it might be assumed it would be most effective. From 1935 to 1938 the method of attacking the problem consisted in holding interviews with perhaps six mothers in an afternoon, investigating any complaints presented and attempting to make suggestions and plans whereby good adjustment could be maintained or reestablished as the case might be. In the course of the three years this service was in operation some 500 families received prophylactic or therapeutic service as indicated by the situation. This work was interrupted for the year during which the study was without a psychiatrist.

This service was reestablished in February, 1940, on a somewhat different basis. It was found that if as many as six mothers were seen in an afternoon, it was impossible to obtain records which would be adequate as a basis for therapy and follow-up studies, and for other research interests. A record form was, therefore, prepared and tried out in the clinic. After several revisions a form was mimeographed which requires an interview of about one hour to obtain the basic data in each new case.

The work of the service was divided into two parts, first, that dealing with cases referred by the pediatricians in the well baby

clinic, and second, prophylactic work with unselected cases from the clinic. "Complaint cases" are referred because of problems which are clearly recognized by the physicians in the clinic. Because of the exigencies of time, the physicians are unable to give treatment for these complaints, and are glad to have a resource to call upon to supplement their physical care of the child.

What is the nature of the work done with these cases? In those cases where no complaint has arisen, a full history is taken from the mother, the answers to form questions being recorded, special topics being expanded as necessary. The use of a form for history taking in a prophylactic project has several distinct advantages. It provides a means for introducing questions in an emotionally neutral manner, that is, the mother is given opportunity to answer questions about activity which may be pathological with the same ease that she answers questions about the essential identifying data. Furthermore, there is opportunity for her to ask questions on any topic which may concern her, and she appreciates the fact that there is a physician in the health department who is interested in behavior patterns of her child. When unhealthful patterns of reaction are discovered they are thoroughly inquired into and the mother's methods of handling them are discussed, making it easier for her to accept suggestions as to what experience has shown to be the best ways of management. On the basis of this study a rapport is built up with the mother, a rapport which is firm enough to allow investigation of her mode of life, her satisfactions and dissatisfactions, so that a fair estimate of family relationships can be gained, and suggestions designed to promote more satisfying living can be made. It is remarkable that a single hour's directed investigation along this line can bring up for discussion such delicate subjects as the unwanted child, the desire for contraceptive information, the resentment of the child's intrusion into parental relationships, as well as the child's problems such as temper tantrums, enuresis, story telling, poor eating habits, etc.

These interviews are followed by a visit of the social worker to the home so that an estimate of the feasibility of suggestions made may be obtained and the rapport established in the original interview be nurtured further in order to maintain relationships which will allow the mother to return to the clinic with further questions

as they arise. It is our purpose to see these cases three times a year for follow-up studies.

The procedure in the "complaint cases" is not very different, though the original interview may require a longer time, and more frequent return visits are necessary in order to adjust the therapeutic program outlined and encourage the mother to carry it out.

It should be made clear that it is not our purpose to act as a therapeutic agency in the ordinary sense of the word since we feel that the purpose of a mental hygiene clinic in a public health organization should be prophylactic rather than curative. In general it is our policy to deal with cases in which the complaints may be handled through work with the mother or by very simple methods with the child. Where special techniques of child psychiatry are required, the case is referred to properly equipped clinics staffed to do this work, just as the pediatrician in the well baby clinic refers seriously ill children to the proper physicians for treatment.

A brief note concerning facts found, danger points suspected and suggestions made in connection with the case, is included in the well baby clinic history and serves to guide the work with the child by personnel in the clinic not directly connected with the mental hygiene service. This we believe to be of some educational importance, both to the pediatricians and to the nurses reading the histories and seeking help in their tasks. Further educational work of the clinic is carried out by the psychiatrist and the social worker who frequently discuss cases with the nurses in charge of them in the well baby clinic. Some more formal case discussions with groups of nurses are held, and, in her visiting, the social worker is frequently accompanied by the public health nurse. We feel that, in spite of the heavy load already carried by the public health nurses, this group who have, in general, excellent rapport with the families they serve, can be the finest tool for dissemination of mental hygiene principles which the present public health program affords.

SUMMARY.

1. Progress in attaining the objectives of a mental hygiene component in a city health district is reported.

2. The 1933 survey indicates that 25 per cent of all psychotics in the district are not hospitalized.

3. Personality disorder of varying severity but sufficient to attract attention by the community is present in about two per cent of the population.

4. Methods of prophylactic work in connection with a well baby clinic of a city health department are outlined.

5. The properly educated public health nurse can be an excellent agent for the dissemination of knowledge of mental hygiene principles.

PERSONALITY DISORDERS WITH BRAIN TUMORS.

By MARK KANZER, M. D.,* NEW YORK CITY.

The present state of knowledge of mental symptoms with brain tumor presents many perplexities. From the clinical standpoint, there is the opinion of Kinnier Wilson that "every neurologist with experience must now agree that the localizing value of mental symptoms in cases of cerebral tumor is practically nil."¹ A series of studies by Keschner, Strauss and Bender² confirm the futility of attempts to utilize such isolated symptoms as "facetiousness" or "incontinence" in the diagnosis of lesions of limited areas of the brain, for these disturbances do not occur as independent manifestations but rather as part of a general disorder of the personality. Here again a problem is raised, for the conception of "personality" is much disputed and lends itself to vague interpretations. Endeavors to subdivide personality into component parts such as "intelligence," "character" and "emotions" merely create new difficulties in definition and description.

The greatest progress in determining the relationship between psychic processes and localization has been achieved in the spheres of psychosensory and psychomotor functions, which represent highly specialized activities of the "total personality." The occurrence of aphasic disturbances as the result of damage to the language areas of the brain is the oldest and best understood of these correlations, but even in this field the diagnostic value is limited (Wechsler³) and the psychological background of the disorders has been the occasion for sharp dispute since Broca published the original cases in 1861. The point raised by Hughlings Jackson that to "locate the damage which destroys speech and to locate speech are two different things" has still not received sufficient appreciation. Most modern observers agree that aphasia is not only a disorder of language but involves general functions of "intelligence" (Marie).

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The difficulties in establishing the relationship between mental symptoms and brain tumors are due especially to two factors: (1) the psychiatric aspect is rarely studied intensively because the frequently rapid course of the illness presents urgent problems of diagnosis and treatment; (2) analysis of the mental symptoms is handicapped by the overemphasis on localizing value rather than on the general aspects of psychopathology. Psychic disorders which would be regarded as emotional reactions if found in a case with pulmonary disease are often regarded as the specific result of damage to a particular area of the brain if the presence of a cerebral neoplasm is ascertained. This is an outcome of too literal an application of the principle that "the brain is the organ of the mind." The fact of the matter is that probably no single mental symptom is exclusively characteristic of brain tumor.

In the belief that a clinical analysis of the mental findings in a large series of brain tumor cases would be useful in further clarifying some of the problems raised, the present survey was undertaken.

THE MATERIAL.

The material used in this investigation consists of the records of 205 cases of brain tumor, comprising essentially all cases with cerebral neoplasm which came to necropsy at The Mount Sinai Hospital in a ten-year period, 1929-1939. Careful inquiry by members of the staff as to the development of mental symptoms and detailed observations as to the behavior and psychiatric status of all patients admitted to the neurological service of the hospital furnished a reliable description of significant changes in behavior and psychic functions.

THE OCCURRENCE OF MENTAL DISORDERS WITH BRAIN TUMORS.

Our series showed the usual wide range of symptoms which are found with brain tumors: disturbances in affect, impairment of memory, clouding of the sensorium, hallucinations, delirium and dementia. There were very few cases which were entirely free of manifestations of psychic disorders. Despite the profuse and apparently chaotic array of symptoms, a study of the clinical course in individual cases suggested that a division into four psychiatric groups might be made on the basis of the pre-operative findings.

Group 1.—Where the development of mental disturbances was gradual, the earliest symptoms consisted most frequently in slight changes of behavior, forgetfulness, irritability and diminution of interest in habitual activities.

Group 2.—As the illness progressed, the "personality disorders" became more marked: the forgetfulness evolved into confusion and disorientation, the lack of interest into apathy and somnolence, the irritability into psychotic outbursts of affect. The clinical picture often suggested general paresis or presenile dementia.

Group 3.—Where the course of events was rapid, the disruption of the personality was more severe. Delirium rather than dementia was characteristic of the clinical picture. Careful inquiry could often elicit a history of gradual changes in the behavior of the patient for a considerable period prior to the onset of the acute episode.

Group 4.—This group represented the terminal phase of brain tumor and comprised relatively few cases because of operative intervention during the early stages. The patients were somnolent or stuporous, frequently incontinent of urine or feces, and often displayed forced grasping and sucking, echopraxia, stereotyped movements, etc.

Analysis showed the importance of the type of tumor and of the elevation of intracranial pressure. The gradually developing disorders of the personality were found to be associated with slowly growing and relatively benign neoplasms; the more acutely developing psychoses occurred with malignant, rapidly growing tumors or with neoplasms so situated as to cause a sudden obstruction of the circulation of the cerebrospinal fluid. Small but rapidly expanding masses often produced far more violent disorders than did large tumors of a benign character; relief of the acute symptoms could often be achieved promptly by reduction of the intracranial pressure. Among the malignant growths, neuroectodermal tumors were accompanied by more severe mental disturbances than were the metastatic neoplasms. The explanation for the milder course of psychic symptoms with the metastatic tumors may be found in the special anatomical and clinical features of these growths. The lesions are usually circumscribed and produce only slight changes in the brain tissue, in contrast to the damaging effect of rapidly growing neuroectodermal tumors with infiltrative ten-

dencies. Clinically, the findings are apt to be dominated by the symptoms of the primary neoplasm elsewhere in the body or by the severe headaches, nausea and vomiting which are particularly likely to occur with metastatic neoplasms (Globus and Selinsky⁴). The psychic symptoms are consequently obscured and, inasmuch as the cachectic condition of the patient frequently results in a rapid termination of the ailment, the involvement of the brain is often not discovered until autopsy.

Episodic mental symptoms with malignant tumors⁴ were noted by Globus. They occurred relatively frequently in our series with tumors which compressed the brain stem or which were so situated as to cause sudden transient blockage of the ventricles. Small hemorrhages into neoplasms or momentary compression of blood vessels by edema or tumor tissue may also provoke acute psychotic behavior. Where such factors did not operate, it is probable that temporary functional disturbances of an epileptic type precipitated the attacks.

A further clarification of the symptomatology was attained when the specific disturbances of cerebral functions were separated from the more general disorders. The former group, consisting of aphasias, agnosias, hallucinations and apraxias, represent disruptions of special psychic processes and are known to be associated with lesions of definite pathways and regions of the brain. The latter group included manifestations of impairment of the sensorium and of the emotional and intellectual processes. Disorders of these special and general forms of behavior together constitute "personality" disturbances and will be the subject of our investigation.

PERSONALITY DISORDERS AND REGIONAL LOCATION OF TUMORS.*

A study of personality disorders with brain tumors will proceed from the description of a representative case from Group 2.

CASE 1.—A 42-year-old salesman appeared "perfectly well" until six weeks before admission to the hospital. At that time members of his family noticed that he was "not quite himself." Previously he had been an energetic, neat and pleasant person. Now he seemed irritable and lost his temper over trifling matters. His former keen interest in business and social activities underwent a change, as did also his personal appearance. He remained at home instead

* See Table 1.

TABLE 1.

DISTRIBUTION OF PERSONALITY GROUPS ACCORDING TO THE SITE OF THE LESION.

N = Neuroectodermal tumors. M = Meningiomas. O = Other tumors.

| Site of tumor. | Group 1. | | | Group 2. | | | Group 3. | | | Group 4. | | | Total. |
|--------------------------------------|----------|----|----|----------|----|----|----------|----|----|----------|----|----|--------|
| | N. | M. | O. | N. | M. | O. | N. | M. | O. | N. | M. | O. | |
| Left frontal | 2 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 11 |
| Right frontal | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 5 |
| Left temporal ... | 1 | 0 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| Right temporal .. | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |
| Left parietal | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 5 |
| Right parietal ... | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Left fronto temporo-pariet. | 1 | 0 | 0 | 4 | 1 | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 11 |
| Right fronto- temporo-pariet. | 4 | 0 | 0 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 9 |
| Left temporo- parieto-occip... | 1 | 1 | 1 | 4 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 12 |
| Right temporo- parieto-occip... | 2 | 0 | 2 | 3 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 12 |
| Left hemisphere (extensive) ... | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6 |
| Right hemisphere (extensive) ... | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Multiple tumors.. | 7 | 3 | 11 | 4 | 1 | 4 | 0 | 1 | 1 | 1 | 0 | 2 | 35 |
| Strio-thalamic .. | 2 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 12 |
| Pituitary | 0 | 0 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| Suprasellar | 3 | 2 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 10 |
| Midbrain | 5 | 0 | 2 | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 13 |
| Third ventricle .. | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 |
| Pons | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| Left cerebello- pontine angle .. | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 6 |
| Right cerebello- pontine angle .. | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 4 |
| Fourth ventricle.. | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 4 |
| Cerebellum | 2 | 1 | 3 | 3 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 13 |
| Total | 42 | 10 | 32 | 52 | 9 | 14 | 13 | 5 | 4 | 18 | 2 | 4 | 205 |

of going to his place of employment; he was absent-minded or forgetful and did not arrange or keep appointments with his friends, as had been his custom. His conversation was dull and he seemed unusually drowsy. Sometimes it was difficult to follow his trend of thought for he would allude irrelevantly to incidents that had occurred twenty or thirty years before. There were no physical complaints except for occasional headaches which did not appear to distress him greatly.

During the week before admission to the hospital the behavior disturbances became still more pronounced. The patient would rise from bed at night and turn the lights on and off. Sometimes he went through the house and insisted on illuminating every room. He was very untidy and even wet the bed at night. On going for a walk in the country, he voided at the side of the road, in spite of the presence of a strange woman. He appeared confused and distracted, was childish and stubborn when his behavior evoked protests, but soon subsided when spoken to soothingly. He could not concentrate on anything for any length of time.

Mental examination in the hospital revealed a dull, somnolent, middle-aged male who was retarded in speech and cooperated poorly in tests. He was frequently incoherent and irrelevant in his responses but did not appear to have any specific language difficulty. He was well-oriented except in regard to the date. Intellectual performances were surprisingly poor for his degree of education. However, there was considerable variability in the success with which he solved the problems which were put to him and the examiner received the impression that lack of interest and concentration accounted to a great extent for the apparent defects in intelligence. Past memory was slightly impaired but not so deeply affected as recent memory. Here again, however, the lack of interest and attention of the patient seemed to be of great importance. He often would repeat certain acts senselessly. In signing his name, he wrote the first two letters correctly but filled the rest of the page with the third letter of his name.

The behavior of the patient on the ward was much disturbed. He was completely indifferent when he voided in bed. He openly engaged in sex play. He showed little insight into his condition and was not concerned when told that he would require a serious operation. He would frequently respond to questions with a strange jocularity and twist the examiner's words into facetious and inappropriate puns. Shortly after admission he lapsed into stupor from which he did not recover. During the semi-comatose state he plucked at his bed-clothes and rubbed his nose frequently.

Comment.—The history of this case may well serve as a prototype for the "deterioration of personality" which is observed with gradually developing cerebral neoplasms. Analysis of the course of the disorder reveals the striking fact that at no stage is the mental picture peculiar to a brain tumor as compared to other psychiatric conditions. At first the patient presents the typical mental

findings of Group 1. He is described as irritable and forgetful, he complains of headaches and no longer takes a keen interest in his appearance or usual activities. His sleep is troubled. Were he to be brought for examination at this time because of some trifling ailment, the mental symptoms might be dismissed as the result of "overwork" or "worry." Not infrequently at this stage, the patient with brain tumor reports that his libido is diminished. He is troubled with vague anxieties and suffers from nightmares or insomnia. Inquiries as to the antecedent history will often reveal recent business reverses or domestic difficulties. The diagnosis of "neurasthenia" or "reactive depression" may be made with apparent justification. In the case which we have described, the patient had been robbed shortly before the onset of his symptoms and his relatives suspected that he was the victim of a "nervous shock." In other cases, there is occasionally a history of a recent head injury and the possibility of a traumatic neurosis receives consideration. As the illness progressed, obsessive and bizarre behavior was noted. With an increasing breakdown of inhibitions, the clinical picture became suggestive of general paresis or a presenile psychosis (Group 2). The terminal coma was marked by involuntary stereotyped acts such as rubbing the nose and plucking at the bedclothes (Group 4).

The lesion in the case which we have described consisted of a tumor of the right frontal lobe, which had partially involved the corpus callosum. There was slight papilledema and normal spinal fluid pressure (120 mm. of water). The symptoms corresponded in their essential features to the mental findings which many observers consider characteristic of pathology in this region. The clinical features comprised blunting of intellect and affect, facetiousness, childishness, increasing apathy and incontinence. Some investigators regard these symptoms as the consequence of disruption of special intellectual functions which are dependent on the integrity of the frontal lobe. The frequency of such syndromes with tumors in other regions of the brain makes this supposition doubtful. It is certain that there is great variation in the character of the disturbances which are found with frontal lobe tumors; Gordon Holmes¹ distinguished three different types of mental disorder which are commonly found with lesions in this region. Two cases selected from other areas of the brain are presented

to illustrate the difficulties in diagnosis on the basis of general psychic manifestations alone.

CASE 2.—A 58-year-old shipping clerk was admitted to the hospital as a brain tumor suspect. During examinations he was dull and indifferent. Both mental and physical responses were retarded and sluggish. He made few spontaneous remarks and, unless urged to pay attention, would stare off into space or gaze vacantly about him. His answers were frequently monosyllabic and on some occasions he would turn his back toward the examiner.

When his co-operation could be obtained, it was found that he was well-oriented in all spheres and that his past memory was well-preserved. In tests that required attention and concentration, however, he did poorly. There were errors in repeating a name and address after five minutes; only three out of ten word-pairs were given correctly; the alphabet was recited without mistakes to the letter "R" and then continued as "RXVTUZY." The intellectual deficiencies of the patient were best brought out in his attempts to cope with arithmetical problems. He counted correctly from 1 to 20, and back; the addition and multiplication exercises caused no great difficulty, but even simple problems in subtraction and division proved insoluble. Spelling was performed without noteworthy lapses, and inquiries as to current events and well-known historical and geographic facts were usually met with the correct answers.

In the days during which he was under observation, the patient displayed striking variations in behavior. At times he seemed clear and alert, at other moments he wandered about aimlessly in apparent confusion and perplexity. Frequently he would laugh or smile incongruously, making facetious remarks and maintain a euphoric attitude even when telling of excruciating headaches. He would often show a tendency to confabulate at such times but would also reveal an embarrassed insight by remarking that "my mind is O.K., I'm just weak." However, he became increasingly somnolent and apathetic.

There was no clinical evidence of increased intracranial pressure. Necropsy findings showed a tumor of the right posterior temporal lobe.

CASE 3.—A 38-year-old house painter began to complain of a feeling of pressure on top of his head. He was unable to work as efficiently as he had done previously and was forced to expend much effort on small jobs that he had formerly accomplished readily. He developed feelings of dizziness and finally had to give up his work because his sense of balance was so uncertain that he could not continue to stand on a scaffold.

On examination, the patient was found to be dull and lethargic, answered questions in a monotonous tone but with an occasional inappropriate smile. The intellectual functions were often difficult to test because he frequently refused to answer questions on the ground that they were "too simple." It could be ascertained that arithmetic and other exercises requiring intelligence were defective and not commensurate with the educational background. Judgment was described as "extremely poor," insight into the illness was lacking and the mood of the patient was definitely euphoric.

There was clinical evidence of a marked increase in intracranial pressure. Necropsy findings revealed an acoustic neurinoma in the right ponto-cerebellar angle.

Comment.—Common to all three cases is a gradual change in the personality of the patient. The normal habits and interests lose their hold and are replaced by indifference. The mood becomes changeable and inappropriate to the situation. On examination, there is the same picture of a dull, unresponsive individual with intellectual deficiencies which seem to be due in large part to lack of attention and ability to concentrate. These three cases are examples of the slowly developing dementia which is dependent on the rate of growth of the tumor and the rapidity of increase of the intracranial pressure rather than on the localization of the lesion within the cerebral tissue.

This fundamental regression of the personality, although appearing with different degrees of intensity in almost all cases investigated, showed variations depending on the site of the lesion. In Case 2, there was a history of an episode shortly before admission in which the patient awoke one morning and for a brief period was unable to recognize his daughter. In Case 3, the patient reported that for some time he had been troubled by noises "like a far off subway train on the right." These two cases are instances of involvement of sensory spheres which have their localized anatomical representation in the brain.

The sensation of a sound like distant roaring which always is heard on one side is symptomatic of a lesion involving the eighth nerve on that side. The patient's description of the noise which he hears is more or less constant: a roaring, the rumble of a train, the ringing of bells. There is seldom any elaboration into more complex forms of hallucinations except in dreams, which represent an interesting phase of psychopathology in these cases and are almost always accompanied by anxiety and often by appropriate visual imagery. This type of mental disturbance is definitely indicative of special localization and therefore belongs with the "specific" rather than the "general" disorders which have been differentiated. Even in this instance, however, the resulting mental picture is not a simple one. Not only does the symptom of tinnitus appear as a loud roaring sound, the result of pathological stimulation of normal sensory pathways, but there is perceptible from

the beginning a personal psychological reaction. The simple noise "sounds" like an express train; in a dream it evokes the image of an express train. Nor does this remain limited to simple imagery. The waking patient is annoyed by a sound which he usually recognizes intellectually as without basis in the real world; the dream reveals a sense of doom represented by an express train racing at him from the right with a terrific roar. One person with such hallucinations will describe them as "like a subway train"; another "like the tolling of bells." Individual experiences are important in determining such descriptions and afford a clue to the varying psychopathology with which the psychiatrist is confronted not only with brain tumors but with other psychic disorders as well.

In Case 2, the boundary between specific sensory disturbances and general emotional and intellectual reactions is even more difficult to define. On awaking one morning, the patient was unable for a brief period to recognize his daughter. After admission to the hospital, it was found that he had a left-sided hemianopia. Patients with extensive impairment of the visual fields are often entirely unaware of the disturbance until they are subjected to a routine examination. They are able to adjust themselves to the disturbance with no appreciable disability except perhaps for a repeated tendency to hit against objects on the affected side or to leave part of a written page blank. When the general mental state becomes impaired, the compensatory behavior fails and the visual disturbances become apparent (Bender and Kanzer⁵). In the functionally confused state between sleeping and waking, the patient presumably passes momentarily through a phase in which he is unable to adjust himself to his disturbed sensory perception. The rôle of psychovisual disturbances in influencing behavior is even more apparent in the following case:

CASE 4.—A 53-year-old plasterer was engaged in conversation when he was struck on the head by the body of a man who had fallen for a distance of twenty feet. He immediately lost consciousness and is estimated to have remained in this state for about half an hour. On recovering, he complained of an intense headache and after reaching home remained in bed for three days. He then returned to work but continued to suffer from headaches. He soon noticed that his work was not satisfactory. He could not finish his assignments as speedily as before and he was forgetful of many things. He

was unable to compute the quantity of materials needed to plaster a room. While working, he would pick up a tool and then realize that he had forgotten what he intended to do with it. His vision troubled him. Colored fiery spots danced before his eyes and he had to give up reading because his vision was blurred and he found the print confusing. He began to lose his way when travelling, got out at the wrong subway stations and on one occasion spent two hours trying to find his way out of the subway.

Comment.—The history of a head injury followed by symptoms of mental disorder might well have suggested a traumatic neurosis in this case until the neurological examination revealed evidence of a circumscribed lesion of the brain. The patient was found to have a left homonymous visual field disturbance and a moderate degree of papilledema (1 diopter bilaterally). On necropsy, a well-defined nodular neoplasm was found in the right occipital lobe. In reviewing the development of the symptoms we find repeated instances of disturbances of visual functions. The perception of fiery colored spots occurs with lesions in the occipital cortex and belongs to the phenomena of crude hallucinations. The report of "blurring" and "confusion" in reading is a noteworthy detail. Although such disturbances may be due to papilledema, the relatively slight changes in the discs make it probable that the reading difficulties were actually a type of alexia dependent on impairment of central visual representation. It is a common finding that patients with such specific reading disorders do not recognize the significance of the disturbance and believe they are troubled with "poor eyesight," although actually the visual acuity shows little change. The suspicion that the reading difficulty was due to the visual field defect is strengthened by the account of the episode in which the patient spent two hours in attempting to get out of a subway station. The superficial interpretation of such an occurrence may be that the patient has dementia. The findings in this instance, however, are typical of the confusion arising from a specific defect, "disorientation in space" which is particularly associated with impairment of vision in the left fields. Such disabilities are compatible with the preservation of a high level of intellectual ability and the distinction from a state of general dementia is important both from the point of view of psychopathology and clinical diagnosis.

THE PSYCHOPATHOLOGY OF BRAIN TUMORS.

There is a constant striving apparent in the behavior of the patient with a brain tumor to adjust to his problems and to cling to the habitual course of his former life. Where the development of symptoms is gradual, the ability to maintain the normal equilibrium may be so successful that slight aphasic symptoms, visual disturbances and other disabilities appear to the patient and his friends as mild manifestations of forgetfulness, confusion, etc. The existence of a pathological mental condition is usually suspected only after the occurrence of some dramatic episode or in situations in which a special demand is made upon the patient's capacities. In Case 2, the man was regarded as behaving extraordinarily only after he failed to recognize his daughter; in Case 4, an increasing intensity of symptoms led to a breakdown only when the patient could not find his way out of the subway and consequently came late to dinner. Occupational factors are also important in determining the date at which the patient's ailment is recognized. In Case 3, a house painter had to give up work early in his illness because vertigo made it impossible for him to stand on a scaffold. A professional man or business executive is more likely to arouse attention early in his illness if he has lost initiative and efficiency than an unemployed clerk. Difficulties in arithmetic precipitate disorders more readily in an accountant than in a housewife. The comparative paucity of mental symptoms in children with brain tumors probably is partly a result of the less rigid social criticism to which they are subjected.

The adaptive resources of a patient may be divided into "positive" and "negative" attempts to cope with the increasing disability to maintain normal life. The positive symptoms include irritability, restlessness, facetiousness, and confabulations, all of which are active attempts of the patient to surmount deficiencies of which he is more or less vaguely aware. Recognition of increasing difficulties arouses anxiety and depression. As the disorder begins to exceed the capacity for active adjustment, another type of defense becomes more marked. The patient does not recognize or denies the existence of his illness. Such an attitude gives rise to "negative" symptoms: indifference, apathy, lack of concentration and cooperation, loss of insight, euphoria and the curious admixture of psychic, motor and sensory elements which

enter into the picture of anosognosia (Babinski) and related disorders. These various defense reactions are essentially similar to those found in the common psychoneuroses and their function in protecting the individual against psychically overwhelming situations is identical. Consequently it is not surprising that "neurotic" phenomena of all kinds are to be found among the symptoms of brain tumor. The patient described in Case 1 developed the obsessional habit of turning the light on and off repeatedly and went through a ritual of going through his house and pressing all the electric switches. A more elaborate development of neurotic behavior is found in another case.

CASE 5.—A 41-year-old upholsterer was seized with attacks of nausea and dizziness. He told his friends that he had a cold because his head "did not clear." Although it was summer, he insisted on keeping all the windows closed to protect him from draughts. At the end of two months his attacks of dizziness forced him to give up his work, which required him to climb ladders. Shortly thereafter he abandoned reading newspapers because he had "lost interest." Three months after the development of the first symptoms his family for the first time realized that there was a change in his personality. They describe him as "friendlier, more talkative, but inclined to make his head cold the one and only topic of conversation." His behavior, however, became extraordinary. He would open his clothing under inappropriate circumstances and explain to strange women that he was "exposing his abdomen to the sun because he had a fault in his intestines which he thought would be cured by this means." He visited a dispensary where he was given medication for his "head cold." On one occasion he was ejected forcibly from the clinic because of a disturbance which he created. Thereafter he spent most of his time in bed because his head "felt clearer" when in a recumbent position. He did not seem to be in great distress but often declared that he would "end it all" if his condition did not improve. While lying in bed he would count aloud from one to one hundred with no obvious purpose. He became increasingly unreasonable and demanded that his wife fetch a dentist from Canada to remove a tooth to which he now attributed his ill health. His sexual potency was greatly impaired. Finally, after three days of almost continual sleep and refusal of all nourishment, he was brought to the hospital. The duration of the symptoms since the onset of the head cold had lasted four months.

The localization of the tumor in this case proved to be in the right hemisphere and involved the temporal, parietal and occipital lobes. There were few clinical signs of increased intracranial pressure.

Comment.—In this case the gradual dementia permitted the adaptive processes to appear more clearly than if the course had been acute. Another important factor in allowing general psy-

chopathic processes to emerge is the absence of striking symptoms such as occur with involvement of the dominant lobes of the brain. The disturbances in such cases are often so disabling early in the illness that clinical recognition is possible before great deterioration of the personality has occurred. Moreover, the language difficulties that are apt to occur with involvement of the dominant areas of the brain also tend to obscure the subtler manifestations of personality changes. Certainly facetiousness is difficult to determine where speech disturbances are present. The absence of specific symptoms helps to account for the relative prominence of general mental disorders with lesions of the prefrontal lobes. Similarly, neoplasms of the non-dominant areas of the brain cause more general mental symptoms, as in Case 5 above. It is probably for this reason that Golla¹ found a strikingly high proportion of cases of tumor of the right temporal lobe among patients in a mental institution, who were discovered on post mortem examination to have previously undiagnosed cerebral neoplasms.

Analysis of the psychopathology of Case 5 is especially interesting because of the hypochondriacal features which it reveals. The patient complains successively of head cold, intestinal disturbances and toothache. It is obvious that he is physically uncomfortable and seeks to localize the ailing organ. Contributory to his diagnostic efforts are sensations which he experiences—nausea, headache, dizziness—symptoms which are common to many ailments. It is natural that the patient sought to interpret his discomforts on the basis of pathological conditions with which he was most familiar. The premorbid personality has much to do with the actual psychic localization of the complaints and with the attitude adopted by the patient to his illness. Moreover, the upsetting state in which the patient is placed may actually contribute to a psychophysiological disturbance of functions which are not primarily affected. Sexual potency, gastro-intestinal disorders (Wechsler²), and other manifestations of automatic nervous control are most easily affected. The previous life history of the patient has great influence in determining such secondary ailments and it is particularly in this sphere that the observations of Freud on emotional fixation have application. The neurological examination of the brain tumor suspect usually emphasizes the signs and symptoms which are relevant for diagnosis but the occurrence of

"psychogenic" disorders such as an hysterical hemisensory syndrome, "sympathetic" pareses of limbs, and bizarre movements is not at all unusual. Moreover, the patient with a brain tumor may utilize his symptoms to gain attention and achieve emotional ends just as in any other case. Such findings are misleading only if a rigid conception of psychopathology as a mechanical synthesis of "localizing signs" is maintained.

Certain aspects of the adaptive tendencies of the patient are best brought out in acute disruptions of the psychic processes (Group 3). Such abrupt disturbances are often characterized by great anxiety and confusion and present a picture which essentially resembles a delirium with Korsakoff features. Sensations are misinterpreted, retention is poor, and confabulations may be prominent.

CASE 6.—A 27-year-old married woman developed a "cold" six months previous to admission. This ailment ushered in a general disorder in which the patient complained of nausea and anorexia and was irritable and vaguely apprehensive. On the advice of her physician, who undertook a routine physical examination and found an intact hymen, she consulted a psychiatrist. Much discord was revealed in her marital life and after some advice about her psychosexual problems an improvement in her condition was noted. Within a short time, however, her symptoms recurred and her admission to the hospital followed. Her mental condition at this time suggested little of significance except a morose disposition. On the basis of the physical findings, a diagnosis of inoperable brain tumor was made and radiotherapy instituted. Her symptoms decreased and she was discharged. After two weeks she was re-admitted and a marked deterioration of her condition was observed. She was now somnolent, apathetic and confused. When asked about events during the interval since her discharge, she replied, "I have not been away." After a visit from her husband, she remarked that she had not seen him for a week. "He is in the ladies' room with women, he likes to be with women." When pressed to explain this remark, she denied having uttered it and attributed the statement to a physician who had just entered the room. The clarity of the sensorium varied markedly and improved after spinal taps or radiotherapy. She would sometimes show insight into her mental state and would then attempt to account apologetically for the disturbances. "Today my memory is terrible—somebody dropped something on my head—a weight of some kind—fell on my head—on my forehead—it knocked me out completely and put me in a trance."

The tumor in this case was found to involve the paraventricular gray on both sides of the third ventricle and to extend into the thalamus and hypothalamus.

Comment.—Tumors which involve the autonomic nerve centers in the region of the third ventricle and brain stem are particularly

apt to produce acute intermittent disturbances in which clouding of the sensorium and motor restlessness are prominent. Such a mental state approximates an apprehensive dreamlike condition or a Korsakoff syndrome. Similar psychoses are found with acute disturbances in other regions of the brain, as in post-epileptic states, particularly when the psychovisual functions of the parieto-occipital lobes are involved. The condition depends upon a syndrome of restlessness, anxiety and distorted perceptions. Toxic conditions favor the development of such a state. It is interesting to record that in Case 6, the patient's relations with her husband played an essential part in determining the content of her delusions. In the earlier stages of the illness, when she was benefited by a visit to the psychiatrist, it is likely that the emotional and organic symptoms reinforced each other and that the relief of the emotional tension by psychotherapy contributed to a genuine improvement in the patient's condition. With the further progression of the lesion, the organic disorders became less ambiguous. Even then, however, the emotional conflicts were sufficiently strong to arouse both a phantasy and a repressive tendency which took the form of attributing her own remarks about her husband to another person. This incident reflects the beginning effacement between reality and imagination and permits the recognition of psychic processes which assume a more disguised form in the phenomena of dreams and hallucinations. A related observation pertains to a tendency of patients to do things in a reverse way while in a semi-confused state. Thus among our material is the case of a French patient who ordinarily spoke English to his business associates and French at home. During confused moments, he reversed this language behavior. Similar disorders have been described with polyglot aphasia, although in the instance described above there was no specific language disability. The frequency of lapses of morality and other inhibitions during the confused state suggests that these reversed forms of behavior are functionally associated with the emergence of tendencies which ordinarily require repression to prevent their overt appearance (Kanzer ⁷).

DISCUSSION.

A review of the cases investigated emphasizes the need for careful analysis of the personality changes associated with brain

tumors. Mere catalogues of mental symptoms are of little value either from the standpoint of clinical diagnosis or psychopathology. Investigation of functions of "intelligence," "memory," "affect," etc., are of potential significance only when the adaptation of the individual to his personal problems and to the test situations are taken into account. A lesion in any part of the brain causes mild or severe disturbances which affect in various degrees the specific and general functions which in their totality constitute the "personality." Damage to such specific functions as vision or language produces certain characteristic reactions of the "total personality" insofar as the person concerned is dependent on these functions for his apperception of the outer world or for his need to communicate with others. These reactions vary with the premorbid personality of the patient and with the disruption of his emotional life which they produce. In this sense, the psychic effect of a language disturbance is comparable to the experience of losing a limb or any other organ (Kardiner). This interpretation is borne out by the strong emotional reactions which are commonly encountered in aphasic patients. The relationship of the specific language disturbance, which is functionally like the loss of a tool of the personality, to the general attitude of the individual shows striking differences which are of great interest from the standpoint of psychopathology. The aphasic patient who is aware of his defect is agitated and depressed or angry, as if frustrated by his inability to express himself; the patient with predominantly sensory disturbances is not greatly troubled by his debility and on the contrary is frequently euphoric and garrulous. Wechsler⁹ emphasizes the loss of self-criticism which is bound up with the shutting off of sensory pathways and the rôle which this plays in the less intelligent behavior of the aphasic patient as the receptive components of his disorder become more pronounced.

The behavior of the patient with a brain tumor is best understood when his efforts to preserve his psychic integrity are evaluated. Goldstein¹⁰ has pointed out the round-about methods by which the individual manages to compensate for his disabilities and has described the "catastrophe reaction" which follows a break in the defensive measure which he unconsciously develops. These defenses may be traced in the facetiousness, apathy, irritability and other general symptoms which are found in the clinical course

of the psychosis. Such mental disorders and defense mechanisms are not peculiar to brain tumors and many of the well-known features of the psychoneuroses and organic psychoses have their counterpart in psychic disturbances which are found with cerebral neoplasms.

The problem of localization can be most productively approached by separating the specific disturbances of mental functions (aphasias, agnosias, hallucinations and apraxias) from the general disturbances. A careful analysis of the latter will often reveal underlying specific disturbances which are of localizing value. "Confusion" may be disclosed as a spatial disorientation associated with an unrecognized visual field defect; "poor memory" may be resolved into an aphasic word-finding difficulty. Study of a case of "dementia" may disclose an apraxic disorder. "Hallucinations" often have their basis not in a primarily delirious state but in disorders of sensory perception. Hypochondriacal ideas and anxiety dreams may all be the source of clues to specific disturbances in the physiological substratum of the psychic life of the individual.

With modern methods of clinical diagnosis, the need for a clinical scrutiny of mental symptoms from the standpoint of localizing value is not likely to be of great significance. For students of cerebral physiology, however, and for an understanding of general psychopathology, the psychiatric aspects of brain tumors will remain a fertile field for research.

SUMMARY AND CONCLUSIONS.

1. Symptoms of psychic disorders were found with few exceptions in a series of 205 cases of neoplasm of the brain.
2. The mental disorders with brain tumors are essentially similar to those found with other types of organic psychoses and range in severity from mild neuroses to delirium and dementia.
3. Four groups are distinguished on the basis of the psychiatric findings.
4. The type of clinical picture which develops is influenced by the premorbid personality, by the specific psychic disabilities dependent on regional localization, and by the course and extent of the underlying pathological changes.
5. The adjustments of the personality to the psychic problems resulting from the brain tumor are analyzed.

6. The need for adequate psychopathological studies as a basis for the localization of mental symptoms is discussed.

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AN EVALUATION OF MANIC-DEPRESSIVE
PSYCHOSIS IN THE LIGHT OF
FOLLOW-UP STUDIES.*

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The problem of diagnosis in dementia præcox and manic-depressive psychoses is still in dispute. When Kraepelin⁸ at first developed the conception of these two diseases, he included more cases in the manic-depressive group. Later, however, he accepted to some extent the views of Bleuler⁷ and placed many cases originally diagnosed as manic-depressives, in the schizophrenic group. Clinically, there are many cases presenting features common to both, and in such cases an early diagnosis is difficult or practically impossible.

August Hoch,¹ in a very early paper, pointed out the difficulty. According to him, 63 out of 88 cases at the MacLean Hospital were correctly diagnosed as dementia præcox upon admission. Fourteen were diagnosed as manic-depressive at first, but were later reclassified as dementia præcox. On the other hand, in only a few cases was the preliminary diagnosis of dementia præcox changed to manic-depressive. He concludes that where dementia præcox traits are of sufficient prominence, a guarded prognosis is indicated.

Lewis and Hubbard² made a follow-up investigation of 77 cases of manic-depressive psychoses. They found the symptomatology so altered that all were reclassified as schizophrenics. They arrived at the conclusion that manic-depressive psychosis is not so common as the statistics of many hospitals would indicate, and that a great number of these manic-depressive cases are really schizo-

*Read at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

phrenics. They found that in their cases which showed mixed features of dementia præcox and manic-depressive psychoses, schizophrenic components were present from the beginning and tended to become more and more prominent with subsequent attacks until the final picture was a frank schizophrenia. They stressed the fact that a persistent feeling of depersonalization, hypochondriacal ideas with bizarre, fluctuating delusional elaborations and outspoken hallucinations are indicative of a serious outcome.

Bumke⁴ emphasized the point that a sharp line cannot be drawn in functional cases. Lange,³ who studied catatonic manifestations in manic-depressive psychoses, stated that it is not to be disputed that catatonic symptoms in a broad sense occasionally occurred with manic-depressive psychosis. On the other hand, he admitted that schizophrenia might go on for years misconstrued as manic-depressive psychosis. Erstine⁵ considered a large portion of manic-depressive psychosis as a forerunner of schizophrenia, apparently because of the fact that many of the schizophrenics start off with periodic episodes resembling manic-depressive reactions.

Under the influence of Kraepelin,⁹ the presence or absence of deterioration was formerly considered the main differentiating factor between the two psychoses. In general, the prognosis of schizophrenia was assumed to be grave. However, in more recent years it has been realized that deterioration is not an absolute characteristic of schizophrenia, because in many cases this deterioration does not set in until very late, and its absence does not indicate a manic-depressive psychosis.

Strecker and Willey⁶ in a paper on the prognosis in schizophrenia indicated that the former pessimism towards this disease is decreasing. They also indicated that, in spite of this changing attitude, there is still a more or less rigid dependence of prognosis upon diagnosis. "Sometimes, and perhaps often, this dependence is so slavish that in a given case a favorable result is interpreted as a sure signal for diagnostic revision," declared these authors.

Schizophrenics have remissions between attacks which, in many cases last for years. One may then raise the question, why bother differentiating the two disease groups? Such classification is desirable in evaluating the newer methods of treatment for schizophrenia which have appeared in recent years.

We examined 27 volumes of records containing 5799 cases of schizophrenia which were admitted to the Manhattan State Hospital. Among these case histories we found that 415 cases of schizophrenia were originally and often repeatedly diagnosed as manic-depressive psychosis. The change of diagnosis in these cases was made at least 5 years after the original diagnosis was established, but in many cases even many more years elapsed before a reconsideration was made. The authors did not participate in the original diagnosis or in the subsequent revision. This point is stressed to indicate that the authors' diagnostic viewpoints were not injected into the original case material and final diagnoses. In reviewing our material we found that the change in diagnoses in these cases was necessary because of the unquestionable schizophrenic picture. Had the authors participated in such a revision, many more cases would have been added to the revised list. Even so, the number of revised cases represented 7.1 per cent of the total figures, which means that every 13th case of schizophrenia was originally diagnosed as manic-depressive psychosis. In the light of the statistics which we gathered and which are to follow, we venture to say that this percentage of change is much greater in many other hospitals where the total percentage of manic-depressive psychosis is far greater than in the hospital from which this material was gathered.

During our investigations we were impressed by the fact that there was a steady decline in the number of manic-depressive cases admitted to the hospital in the period 1928 to 1938 despite the fact that there was an increase in the total admissions for that period. This led us to an investigation and comparison of the admission rates of manic-depressive psychosis and schizophrenia in our hospital, in other hospitals in New York State, and in other states. The figures for the other states were obtained from Federal statistics.¹⁰

In the year 1928, 1815 new cases were admitted, 15.7 per cent were diagnosed as manic-depressives, 19.6 per cent were placed in the dementia præcox category. In the subsequent years the number and percentage of manic-depressive and schizophrenic psychoses fell off; but the schizophrenic cases became only slightly less. Such observations are not confined to one hospital but are present in other hospitals in New York State which serve an area

in which no rapid shifting of the structure of the population occurs. Generally the percentage of admitted schizophrenics remained the same, while the number of manic-depressives dropped considerably. The only factor we can attribute this to is a change in the viewpoint in evaluating the clinical picture.

Even more striking is the discrepancy if we compare statistics in the different states. In the year 1926, 13.2 per cent of the total admissions in New York state hospitals were manic-depressives, 26.7 per cent were dementia præcox cases; while in California in the same year, of the total admissions 20.8 per cent were manic-

TABLE I.

REPRESENTING THE TREND OF MANIC-DEPRESSIVE PSYCHOSIS AND
DEMENTIA PRÆCOX IN MANHATTAN STATE HOSPITAL,
WARD'S ISLAND, N. Y.

| Year. | Total admissions. | No. of M. D. | No. of D. P. | Per cent M. D. | Per cent D. P. |
|------------|----------------------|-----------------|-----------------|-------------------|-------------------|
| 1928 | 1815 | 285 | 357 | 15.7 | 19.6 |
| 1929 | 1814 | 305 | 274 | 16.8 | 15.1 |
| 1930 | 1808 | 230 | 297 | 12.7 | 16.4 |
| 1931 | 1741 | 201 | 279 | 11.5 | 16.0 |
| 1932 | 1857 | 180 | 263 | 9.7 | 14.2 |
| 1933 | 1633 | 123 | 201 | 7.5 | 12.3 |
| 1934 | 2121 | 187 | 281 | 8.8 | 13.3 |
| 1935 | 2330 | 159 | 336 | 6.8 | 14.4 |
| 1936 | 2181 | 98 | 301 | 4.5 | 13.8 |
| 1937 | 2203 | 100 | 254 | 4.5 | 11.6 |
| 1938 | 2236 | 115 | 280 | 3.1 | 12.5 |

depressives and 23.2 per cent schizophrenics. In 1936 in New York, 8 per cent of the cases were manic-depressives, and 25.2 per cent schizophrenics; while in California, 12.7 per cent of the cases were manic-depressives and 21.7 per cent schizophrenics. In ten years, naturally the population shifts, but due to the lack of immigration in the last ten years the shift was not marked enough to account for such variations. We can only assume that the diagnostic criteria were not the same in 1926 and in 1936, and were probably not the same in the State of New York and in the State of California. The statistics from the State of Mississippi, where the population is fairly constant, best illustrates this point. In that state in 1926, of the total admissions 7.9 per cent were manic-

depressives and 23.9 per cent schizophrenics; while in the year 1932, 25.6 per cent were manic-depressives, and 19.1 per cent schizophrenics. In 1934 the percentages were 20.7 per cent manic-depressives and 21.1 per cent schizophrenics, but one year later, in 1935, manic-depressives dropped to 4.6 per cent, and schizophrenics remained about the same. Such variations cannot be attributed to any radical change in the population structure or to any violent economic or migratory upheaval. The only plausible cause is a change in the diagnostic criteria.

The statistics of Georgia differ from the other states. There the manic-depressive psychoses far exceed the number of schizophrenics. Are we to assume that the population of Georgia consists of more extraverted individuals?

Statistics show that the number of schizophrenics remains about the same in nearly all the states. The number of manic-depressive cases shows a slow constant drop, but there is extreme variability throughout the country. The text books give the impression that the two disease entities are sharply defined and that only a small percentage of cases show unclear symptomatology where differences in diagnosis might arise. The variability disclosed in the statistics indicates that this so-called small, unclearly defined group is much greater than generally believed, and that definite differential criteria will only be established when the etiology of these psychoses is known.

The cases we observed could be divided into two groups. In one the differential diagnosis between manic-depressive psychosis and schizophrenia was, at first, impossible, and only further development of the psychosis revealed its true nature (this group was the smaller one). The second group, the larger, showed mixed features, and most of these cases later regressed to the point where the diagnosis of schizophrenia was unquestionable. Some of these which we would classify as periodic cases of schizophrenia, during the first or second attack resembled manic-depressive psychosis. In the subsequent attacks, however, the schizophrenic symptoms became more and more apparent. Many of the cases which were diagnosed formerly as schizo-affective psychosis turned out to be cases of schizophrenia.

In reviewing our material we must arrive at the conclusion that in many cases a diagnosis of manic-depressive psychosis was not

made on the basis of the clinical observations because we were unable to find any characteristic cyclothymic symptoms. The description of many cases was often that of schizophrenia, but the diagnosis was manic-depressive, disregarding the basic clinical symptomatology. The diagnosis was probably made because of quick recovery and periodicity of the attacks, or the presence of so-called psychogenic factors which impressed the examiner so much that he overlooked the fundamental symptoms. In other cases we found, in addition to the manic-depressive symptoms, other symptoms of a schizophrenic nature which should have indicated some caution in making the diagnosis of manic-depressive psychosis.

When there was a history of schizophrenia in the family, it was more likely that the psychosis which the individual presented would develop into schizophrenia despite the early manic-depressive symptoms. At this point it is important to mention the investigation of Kallmann, who in opposition to others, after a very large and exhaustive study arrived at the conclusion that in the hereditary cycle of schizophrenia, manic-depressive psychosis does not occur.

Though in our material the personality make-up was not sufficiently evaluated, it is possible to point out that peculiar, egocentric and asocial individuals develop schizophrenia, even though in the beginning the dementia præcox symptoms are not very outstanding. In the records we found patients described as sociable and with open make-up. A more careful study often discloses that the sociability was only a compensatory one, and while they met people, actually did not have adequate contact. This type of sociability differs from the spontaneous and warm sociability of the pyknic individual.

Periodicity or repeated attacks of a short duration are still considered in many quarters as a characteristic of manic-depressive psychosis. Many cases of schizophrenia have quite a number of attacks with apparent well-being between the psychotic episodes. We found in our material that attacks of short duration with good remissions were very frequently diagnosed manic-depressive psychosis, with emphasis on the short duration of the attack to the exclusion of the schizophrenic clinical picture present. We discovered cases which were diagnosed correctly as schizophrenia in

the beginning, but later the diagnosis was changed to manic-depressive psychosis because of the rapid recovery. It is important to emphasize that in many of these so-called good recoveries, a careful examination will disclose defects in the affectivity or in the behavior, which should lead one to suspect that the recovery was not an absolute one, and therefore did not justify the manic-depressive diagnosis.

Generally, not much attention was paid to the ideation (thought content) of the patients. Stress was laid on the emotional factors, and autistic and dereistic thinking was ignored. Illogical remarks or incongruous statements with bizarre elaborations should always arouse the suspicion of schizophrenia, even though no other signs are detectable. No thought content or behavior response is present without an affective component. Therefore, the interrelationship of thought content and affect requires close scrutiny. Affect is never dissociated from content in true manic-depressive psychosis, but runs parallel to it in a harmonious relationship. We found in our cases that even slight dissociation is indicative of schizophrenia.

Concerning hallucinations and delusions, our material gave the following information: auditory hallucinations and paranoid delusions occurring in a manic setting end up invariably as schizophrenia. These hallucinations and delusions were frequently overlooked because of the predominantly manic-like picture. Differentiation in depression is difficult, but projection mechanisms, ideas of reference and persecution in a depressed setting very often indicate a schizophrenic psychosis. Hypochondriasis without adequate affective tone is also strongly suggestive of dementia præcox. The rapid changing of the delusional and hallucinatory content very often accompanied by fluctuating affect are also more indicative of schizophrenia than manic-depressive psychosis. In the latter the affective change from elation to depression occurs more slowly than in schizophrenia.

It is also important to study the motor responses of the patient. These should be harmonious with the affective component. Dissociation in this relationship is as significant as dissociation between thought content and affect. The so-called akinetic manias of Kraepelin are all cases of schizophrenia in our opinion.

All the factors which we have discussed are well known and may even be considered elementary. Nevertheless, if time were taken

to examine the case records of many hospitals, the errors we have mentioned would be found repeatedly. It is our belief that errors in diagnosis are due mainly to the fact that follow-up studies are rarely made, and only as special research problems. Just as diagnostic and parole presentations are a phase of hospital routine, so also do we believe there should be periodic reconsideration of diagnosis. Such periodic reconsideration would tend to diminish such errors as were revealed by our study.

A citation of a few of our cases may illustrate more clearly the basis for our conclusions. The case of L. K. is an example of an adequate original diagnosis subsequently changed because of a single incident, which had no relation to the symptoms other than as a possible precipitating factor. The final diagnosis was dementia præcox.

L. K., No. 84817.—Admitted June, 1928; aged 29 years; single. Modest, prudish, sensitive; no love affairs; fairly secretive but regarded as lovable and cheerful. One week prior to admission she thought she was being spied on. She thought someone was sending up powder; acted peculiarly. Said men followed her; complained of having sensations; became restless, sleepless. Was committed. In the hospital she was disturbed, restive, expressed many delusional ideas; that something came up from the floor to annoy her and people talked about her. Patient was tentatively diagnosed dementia præcox, paranoid type. Later in the course of her hospitalization it was learned that patient had been sexually assaulted prior to admission, and on the basis of this admission the diagnosis was changed to manic-depressive, depressed. Discharged as recovered with the same diagnosis.

Patient seemed to adjust for two years. Prior to re-admission became irritable, fearful, left home. Upon return said the whole place was electrified, was excited, restless, and after medication said she was poisoned and had to be hospitalized. At the hospital was depressed. Expressed delusions of persecution against the male sex, was apprehensive, refused to eat the food because she thought it was poisoned. Continued irritable and suspicious. Memory intact; sensorium clear. Would sit and talk to herself. Answers flippant. She accused a man in the neighborhood of communicating with her and using radio as a medium. Said men tried to dope her and electric wires were in the trees. Final diagnosis: dementia præcox, paranoid type.

The case of C. B. is an example of inadequate evaluation of symptoms correctly noted.

C. B., No. 83777.—Admitted February, 1919. Aged 25, single; dressmaker; Hebrew. Grandmother died in a mental hospital; maternal aunt "insane." Father deserted mother. Patient had Pott's disease; lame; described "open, sociable, stubborn and suspicious." At the time of first admission noisy, con-

fused, tube fed; expressed delusions and hallucinations; stereotyped gestures and automatism present. No diagnosis made. Following month admitted to a private hospital. Restless, distractible. No hallucinations or delusions noted. Diagnosis: manic-depressive excitement with psychogenic factor. Transferred to another sanitarium where she continued overactive, exalted, with flight of ideas. Discharged in 1921 as improved with a diagnosis, dementia praecox, paranoid type. Was re-admitted to M. S. H. in July, 1923, being well until 6 months prior to admission, when she became queer with maniacal periods. Expressed ideas of poisoning and persecution with auditory hallucinations. She was described as being "flighty with periods of excitement." Improved and paroled in 1925 with a diagnosis of manic-depressive, manic. On parole noted as "silly, without insight." Admitted hearing voices and that God spoke to her. Her adjustment during the subsequent period was poor. Shortly before admission began to complain that men were too familiar with her; they made sexual advances towards her. Wanted to kill her mother. On re-admission manneristic, self-absorbed. Inadequate emotional tone. Spoke in a scattered manner. Expressed auditory hallucinations. Claimed she was Jesus Christ and was in love with angels and spirits and heard their voices coming from heaven. Talked about sexual perversions. Diagnosis: manic-depressive, manic. In July, 1934, case was reviewed and diagnosis changed to dementia praecox, paranoid type.

The case of A. C. is indicative of a situation where the ideational content was ignored, and because of this inadequately diagnosed at first, and it necessitated revision subsequently.

A. C., No. 43695.—Admitted in September, 1913, at the age of 56; widow. F. H. was negative. Personal early history unknown. Married life normal. In 1898 she was depressed for six weeks. From 1902 to 1904 had been depressed at times and then excited. Details of this attack unknown. Following her husband's illness in 1913 she became excited; thought the medicine was poisoned; called herself Dr. Levy, performer of bloodless operations; turned against her best friends, became unruly and was committed. In the hospital was excited, talkative, distractible and boastful. Showed sudden changes of mood; was profane and destructive; indolent, and was not cooperative. Diagnosis of allied manic-depressive insanity was made. She later identified herself as certain prominent individuals in the country; had hallucinations of sight and hearing. Was playful; said she was only 4 years old. Became restless, irritable, with affected speech. Mood was generally one of elation. No definite trends could be elicited but on admission she expressed ideas of persecution. Final diagnosis, allied to manic-depressive insanity, and was paroled.

Re-admitted in September, 1916. Depressed, unable to sleep due to evil spirits running around in her clothing forcing her to tear them. She was over-active, over-talkative, grimacing; wetting and soiling herself. Later noted as rambling, irrelevant, poorly accessible; said "my brains must have been taken out or not fully developed—sometimes I hear voices. I think I

must have been persecuted by enemies. I am a sorcerer and sorceress—I can mesmerize. I am charged with electricity. I make ships and boats." The original diagnosis was maintained. In October, 1931, the diagnosis was changed to dementia præcox, paranoid type.

The case of E. McG. illustrates the inconsistency in evaluating the symptoms, whereby in one sanitarium a patient is diagnosed as dementia præcox, and in another manic-depressive within a period of a few days.

E. McG., No. 83225.—On his last re-admission in October, 1930, he was 29 years old, married, salesman. Make-up, quiet, fond of dancing and sociable, and liked girls. In 1918 he worked in the neighborhood of Wall Street where an explosion took place. Following this he became nervous, excited, and was sent to a sanitarium for 7 months. No information of this admission. In September, 1920, was admitted the second time to a sanitarium. He was restless, excited, spoke continually in an irrelevant manner, threatening to kill all who came in contact with him. Auditory hallucinations present. One night he set his clothes on fire, and smiled and laughed without cause. Diagnosed dementia præcox. Discharged November, 1920, and re-admitted a few days later to another sanitarium, and there with similar symptoms he was diagnosed manic-depressive psychosis, manic type. Discharged March, 1921.

Patient worked until 1923, then ran away from his working place. Became excited, restless, talked in a flighty manner and was hospitalized. In the hospital he rambled in a disconnected manner and expressed ideas of persecution against individuals and organizations. Later on he was correctly oriented and spoke relevantly and coherently. Said that the Catholics and the Black Hand were persecuting him. Admitted homosexual practices and onanism. Diagnosed manic-depressive, manic type. Paroled in 1925, condition recovered. He adjusted well in the interval and married in 1930. In June, 1930, he became dissatisfied. In September of same year he lost his position and became depressed, and was hospitalized in October of the same year. Said he came for a rest. Was bashful, disdainful, slightly perplexed. Diagnosis: manic-depressive psychosis, depressed type. At first he cooperated well, but later became demanding; said he had enemies in the office where he worked and was being persecuted; threatened to kill everyone around him. His mood changed rapidly. He was jealous of his wife's employer and thought people in his office were jealous of him because he had a pretty wife, and they conspired against him. Expressed many hypochondriacal ideas. Said he was Jesus Christ and also said that his father who was dead was talking to him for many years. He eloped from the hospital, held up a chauffeur in a car, and said he did it because he liked his looks. Was arrested and re-hospitalized. Diagnosed dementia præcox, paranoid type in November, 1930.

SUMMARY.

Many cases which were originally diagnosed as manic-depressives were subsequently reclassified as schizophrenia.

Review of New York State and Federal statistics for other states show:

(a) Marked fluctuation in the number of manic-depressives as compared with dementia præcox and in relation to total admissions.

A complete reversal of the general trend in some states.

Special case studies reveal that errors in diagnosis result from the failure to apply the established criteria of symptomatology.

A need for periodic reconsideration of diagnosis is indicated.

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DISCUSSION.

CLARENCE O. CHENEY (White Plains, N. Y.)—I seriously wonder not infrequently, whether we haven't made a fetish of statistical classification. The classification of a patient as a case of dementia præcox or manic-depressive reaction does not mean a diagnosis. A diagnosis means knowing the patient, enumerating the assets and the liabilities, the material that the

patient evidently had to work with and handicaps that he had, with some statement probably as to the outcome and the best method of treatment. That's the diagnosis; but possibly because of the emphasis on statistics we have come to feel that the statistical classification is a diagnosis.

It is necessary of course to use statistical classifications as symbols. We use symbols as short cuts to long descriptions repeatedly in our ordinary language and particularly in psychiatry. And if the symbol of dementia præcox or manic-depressive means something to us, well and good; but it is preferable not to think that it tells the whole story. Now in considering the so-called classifications of dementia præcox and manic-depressive reactions, I think we should bear in mind that we are dealing not with an etiological classification, but with a symptomatological classification. Such latter classifications always tend to be unsatisfactory. The best classification and the best statistical method is on an etiological basis. We have such etiological classifications in the psychoses which are due essentially to cerebral arteriosclerosis, although we know that all of the symptoms are not necessarily due to arteriosclerosis, but are due in large part to the patient's personality. A case of general paralysis we classify according to the main pathological changes, that is a meningeal, syphilitic encephalitis, irrespective of the side symptoms the patient may show, whether he is excited or depressed or demented. We say that he is a case of general paralysis if we have reason to think that he has certain brain changes.

Now that type of classification and definition is much easier than in manic-depressive and dementia præcox reactions. In manic-depressive and dementia præcox reactions we are dealing with constitutional disorders. I cannot agree by any means with the conception that they are disease entities. There is no reason why nature may not make combinations of constitutions. It would be very difficult to describe any one of us as a pure type of constitution. We know that certain persons are apt to develop dementia præcox and that certain persons are apt to develop manic-depressive reactions, and we know also that certain persons won't develop either one of those reactions, no matter what the stress is. I believe that there is no symptom in either the manic-depressive or dementia præcox reactions that may not be shown in the other.

If we get away from the habit of thinking that a diagnosis so-called of dementia præcox means that the patient has a poor outlook, I think we shall treat our patients a good deal more satisfactorily and have more recoveries. It has been said here that the classification is important from the standpoint of treatment, particularly with reference to the newer methods of treatment. I don't agree with that. I have no definite idea that metrazol or insulin is specific for either dementia præcox or manic-depressive reactions.

My final word would be that although statistics like these are of interest, the important thing to do is study the patients from the clinical standpoint to see what can be done about them; to treat them as energetically and as intensively as we can; to give up the idea that dementia præcox is an incurable disease; and not to spend so much time with the statistical diagnosis as classification, but to try rather to make more real diagnoses.

NOLAN D. LEWIS (New York City).—My personal opinion, to which a good many will take exception, but one reached after 25 years of living with psychotic people, is that pure manic-depressive is a very rare disease, particularly in the institutions. It is seen, I think, a little more often in private practice; but in hospital work pure manic-depressive reactions without schizoid features is unusual.

The paper has demonstrated the importance of reviewing these cases and following them for years to see what patterns they follow. In this way we may get more light on this question of the so-called constitution.

In this connection, it might be mentioned that in our investigation of twins at the Psychiatric Institute, it has never been found in all of our work so far, that one has dementia præcox and the other manic-depressive psychosis.

PAUL HOCH (closing).—It is an interesting point that in the minds of many psychiatrists a psychogenic incident or a situational factor which precipitates a psychosis is accepted as a manic-depressive manifestation. We have cases in which the diagnosis was only revised because it was discovered that the patient was exposed to some peculiar life experience which precipitated the psychosis, and it was assumed that we must have a manic-depressive psychosis because schizophrenia is not precipitated by psychogenic factors. This is rather strange after so many years of teaching that schizophrenia is only a reaction to certain life situations. Nevertheless it is true in many cases that such a revision is made.

I want to reemphasize our point of view that the cases should be looked over after a few years time and checked against earlier diagnoses. While some of the concepts enunciated by Kraepelin are changing, others are still valid. Bleuler expresses the point of view that Kraepelin is right with his concept of deterioration in the long run, but he is not right in a short run.

PROLONGED COMA IN INSULIN THERAPY OF THE PSYCHOSES.*

By HERVEY CLECKLEY, M. D., AND C. M. TEMPLETON, M. D.,
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Numerous reports of prolonged coma during insulin therapy may be found in the literature, and several attempts to account for its occurrence have been made. The fact remains, however, that the persistence of coma despite administration of glucose is often puzzling and sometimes impossible to account for adequately. Since fatalities occur not infrequently during the protracted coma, it is obviously important that every effort be made to seek understanding of these reactions and means to prevent them. It has been suggested by Freudenberg¹ that the failure of a patient to arouse from coma upon the administration of glucose is probably due to a deficiency of thiamin chloride. This observer has reported that patients in prolonged and apparently irreversible shock are promptly awakened by the administration of thiamin chloride. The logic of such treatment is obvious since it is well known that the amount of thiamin chloride required by the organism is closely related to the caloric intake and especially to the amount of carbohydrate which is metabolized.^{2, 3, 4} In insulin therapy patients are given unusually large amounts of glucose to awaken them from coma. This results in an increase of daily carbohydrate intake and in the ratio of carbohydrate to other foods metabolized. Since riboflavin and nicotinic acid are also necessary factors in cellular oxidation, and since the demand for these factors is increased during insulin treatment, one might surmise that a lack of riboflavin and nicotinic acid could similarly play a part in changes which underlie delayed awakening or failure to awaken from insulin coma.^{5, 6, 7} The fact that nicotinic acid has been used successfully with stuporous and comatose patients free from other signs of pellagra would encourage the suspicion that nicotinic acid deficiency might have an important relation to states of coma developing in insulin therapy.^{8, 9} Some cases of

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prolonged coma resulting in death have shown gross brain pathology which would account for continued coma and the other phenomena noted in such states.¹⁰ Since convulsive activity¹¹ has been noted during protracted coma, the supposition that elevated spinal fluid pressure, which has been found in experimental animals to be associated with the development of convulsions in hypoglycemia,¹² has some relation to the persistence of coma is an hypothesis that deserves investigation. Some observers have concluded that the failure to awaken from coma depends on definite pathological changes in the neurones which they believe occur during the regular period of insulin treatment.¹³ The status of patients during protracted coma is extremely variable and the duration of such comas apparently unpredictable. The following case summaries are offered as illustrative of the unpredictable and surprising course of patients in non-hypoglycemic coma. In the interest of brevity only those observations considered of especial significance are recorded.

CASE I.—L. K., white female, age 48, admitted to the University Hospital Oct. 28, 1938, with poorly systematized delusions and auditory hallucinations of several weeks duration. Diagnosis: schizophrenia, hebephrenic type. Physical, neurologic and laboratory examinations, including lumbar puncture, showed nothing significant. Insulin therapy began Oct. 29 with 30 units. First coma of moderate degree obtained Nov. 3 with 90 units. On Nov. 4 a similar coma was obtained with 80 units. Corneal reflexes were never lost; coma lasted between one and a half and two hours and awakening was prompt.

On Nov. 5 with 80 units of insulin a third coma was produced. No danger signs such as marked pulse changes, respiratory difficulties, cyanosis, hiccoughs or seizures were noted. The corneal reflexes remained active. The patient appeared to be only mildly comatose, grunting and pulling away when the eyelids were lifted to examine the eyes. At noon, after five hours of hypoglycemia and two hours and fifteen minutes of coma, glucose, 150 gm., was given by nasal tube. The patient did not awaken promptly, so one hour later 100 cc. of 50 per cent glucose was given intravenously. Additional glucose was given at this time by nasal tube. Shortly afterward adrenalin, thiamin chloride, 10 mg. intravenously, nicotinic acid, 150 mg. intravenously, were administered. The blood glucose was found to be greater than normal. No definite response was noted following these procedures but the coma appeared to become steadily milder. After several hours she would raise her hand promptly and purposively to brush away a wisp of cotton when it was drawn across her face. Elevation of temperature, restlessness, evidence of shock or illness, and abnormal motor activity, so often described in persistent coma, were absent.

During the next four days the patient remained in a state of altered consciousness but entirely free from any other evidence of disorder. The blood

glucose remained normal. Repeated neurologic examination and general physical examination showed nothing significant. The temperature, pulse and respiration remained normal except for a brief rise in temperature to 101.6 (R) on the second day of coma. The degree of variation from normal consciousness gradually lessened. She responded to even the mildest stimuli, such as touching the skin with cotton, pulling the hand away or brushing off the cotton. She took food and fluids readily though her eyes were kept closed and she did not speak. She smiled in response to requests that she wake up and seemed to react playfully when the nurse called her "sleepy head." Her expression was one of ease and contentment. She shook her head as if in vexation when stimuli were applied. This patient appeared to observers as free from ordinary signs of physical illness. At times she gave the impression of feigning a state that resembled sleep in some respects but in which she reacted as one aware, to a considerable degree, of her surroundings. On the fifth day of her non-hypoglycemic state of coma (or pseudo-coma?) she was examined by a psychiatrist from another institution who had had an extensive experience with insulin shock therapy. This observer did not believe the patient was comatose and ascribed her condition to hysteria. On the sixth day of coma she did not void or defecate and was catheterized and given an enema. Throughout the seventh and eighth days, however, she seemed aware of her surroundings and looked as if she were enjoying a game. During the earlier days of coma when the eyelids were passively opened she appeared to be staring blankly. Now she seemed to focus on persons about her and to notice them.

During this period thiamin chloride in large amounts (10 mg. to 30 mg.) was given daily intramuscularly, intravenously and, once, intrathecally. Nicotinic acid, 300 mg. daily, was given and on the sixth day, riboflavin, 15 mg. intramuscularly was begun. Lumbar puncture showed a normal pressure, normal glucose content and nothing significant. During the first few days the usual temporary erythema that accompanies intravenous administration of nicotinic acid was not noted. After the fourth day this erythema appeared.

On the eighth day of coma the patient grew restless, the temperature rose to 103.6 (R) and the pulse to 140. Examination by the internist showed nothing significant. This restlessness increased during the next two days until the patient became constantly hyperactive, thrashing about the bed and groaning. On the tenth day of coma the abdomen became distended, cyanosis developed and the pulse became feeble. Appropriate stimulants and nasal oxygen were administered, but, after a brief improvement, the patient died in what appeared to be a peripheral vascular collapse.

At autopsy* no gross changes in the nervous system were noted. Pulmonary congestion, early lobular pneumonia and cloudy swelling of the viscera were apparent. Microscopic studies revealed fatty degeneration of

*For this material the writers are indebted to Dr. E. R. Pund and the department of pathology, School of Medicine, University of Georgia, Augusta, Ga.

the liver, numerous perivascular petechiae in the cerebral cortex and occasional perivascular petechiae in the pons. Numerous corpora amylacea were seen in the cerebrum and the brain stem.

CASE 2.—M. B., white, female, age 42 years, was admitted to the University Hospital Sept. 15, 1938. For many years she had been complaining with great vigor and persistence of pains in her mouth and neck and over various parts of the body. She frequently smiled and laughed while describing the excruciating anguish that racked her, she insisted, at the very moment. Dramatic gestures accompanied the frantic words with which she poured forth detailed descriptions of the pains and distressing sensations she constantly endured. She gave a strong impression of being not in physical pain but in a magnificent state of jitters. The eloquence of her complaints and the enthusiasm of her gestures suggested that she might be satisfying some deep need by the impressive recital. "Now, darling," she would say, seizing the examiner's hand, "You're sweet to me, do help me, do . . . Darling . . . now I mean, Doctor. Oh, Honey, I don't mean nothing by that . . . none of that sex stuff you know. . . . It's just my way. . . . You know I was choked and raped twice on my wedding night. . . . I done had eight teeth pulled . . . bled all night . . . most filled a big bucket. . . . Nearly all the blood went out of me," etc. She continued in rapid bursts of circumstantiality so wild and shifting that they defy description or literal repetition. She demanded immediate operations on her throat, abdomen, neck, teeth and other parts of her body. She would frequently seize the examiner's hand and place it in her mouth, then move it along her neck outlining, she said, the course along which her pains sped, rending her in each passage. The patient had made a very poor adjustment for many years being supported by her sister with whom she wrangled extravagantly. She went around in disheveled rags, her face rouged and painted in fantastic shades.

General physical, neurologic, spinal fluid and laboratory examinations showed nothing significant. This patient was considered as fundamentally a case of hysteria but, in a practical sense, psychotic.

After eleven days of insulin therapy and five days of moderate, uneventful coma, on Oct. 1, 90 units were given. Moderately deep coma was established at 10 a. m. (three hours after insulin administration). At noon the corneal reflexes were still present. No danger signs had been noted. Glucose by nasal tube was given as usual. The patient did not emerge from coma and 45 minutes later 50 cc. of 50 per cent glucose was given intravenously. Within the next few hours additional glucose intravenously and by mouth and thiamin chloride, 30 mg. intravenously and 10 mg. intrathecally, were given. Adrenalin had already been given twice. The cerebrospinal fluid was under normal pressure and contained 100 mg. of glucose.

Despite the continued administration of thiamin chloride and a normal or increased blood glucose level, the patient remained comatose for three days. There was no marked elevation of pulse or temperature and, after the first few hours, no restlessness, twitching, torsion spasms or other abnormal motor activity. The eyes were often open and at such times a wild stare was noted.

After three days the patient smiled and answered questions. She was no longer in coma. She continued, however, for seventeen additional days in a state of indifference, confusion and disorientation with aphasia. When asked her name she replied "1896" and spontaneously complained of pain in her arm which she explained was caused by the presence of a "stronjer bone," also known as "a majestic." This bone, she said, could be used as a telephone.

Twenty days after the onset of the prolonged coma a marked redness of the tongue, without papillary atrophy, was noted. Nicotinic acid, 100 mg. intravenously, was administered and within 24 hours the disorientation, confusion and aphasia disappeared. The former vigorous, hysterical complaints returned in full measure.

CASE 3.—H. B., white male, 17 years of age, admitted to the University Hospital Jan. 14, 1938, showing the typical picture of schizophrenia, hebephrenic type. After sustaining uneventfully 21 comas, the last with 175 units, he was given 100 units of insulin on Feb. 23, the intention being to reduce the dosage gradually rather than to discontinue treatment abruptly. After remaining in coma for one hour and fifty minutes he became cyanotic and râles were audible over the lung bases. The administration of glucose by mouth and intravenously and of adrenalin brought about no change. He was placed in an oxygen tent. He continued cyanotic and with signs of pulmonary edema for five hours when the physical signs subsided and the coma disappeared.

CASE 4.—F. N., white male, 63 years of age, admitted to the University Hospital, Oct. 26, 1938, after having made a sudden excursion upon the street in complete nudity to join some boys who were playing football. He presented a typical picture of manic-depressive psychosis, manic phase. Thiamin chloride, 10 mg. daily subcutaneously and nicotinic acid 150 mg. by mouth, were given prophylactically when insulin therapy was begun. After four days of treatment coma was obtained with 75 units on Oct. 31. After coma had persisted for one hour the corneal reflexes could not be obtained. Fifteen minutes later glucose, 250 gm., was given by nasal tube. The coma persisted but after thirty minutes the corneal reflexes could be obtained. Despite the administration of thiamin chloride, 10 mg. intravenously, and additional glucose intravenously, coma continued for ten hours. There was a moderate elevation of temperature but no abnormal motor activity during the non-hypoglycemic coma except restlessness during the last few hours.

CASE 5.—L. S., colored female, age 41, admitted to the University Hospital Aug. 2, 1939. Diagnosis: psychosis, type undetermined. After unsuccessful treatment with large doses of nicotinic acid, insulin was begun on Aug. 9. On Aug. 11 a third coma was obtained with 40 units. After one hour and fifteen minutes of coma (3 hours and 15 minutes after the administration of insulin) 50 cc. of 50 per cent glucose was given intravenously. The patient was not apparently in a deep coma. The corneal reflexes were active. She aroused within one minute after the glucose was given, apparently regaining

consciousness satisfactorily. After 15 minutes, however, she became unconscious again, and 100 gm. of sugar was given by nasal tube. Thirty minutes later, since she was still comatose, glucose was again given intravenously. Thirty minutes later pulmonary edema was apparent and soon afterwards (two hours after the first attempt was made to interrupt coma) grand mal seizures began. These consisted of clonus only, lasted one minute and came with surprising regularity at intervals of 8 to 11 minutes. During the next 3 hours 17 major seizures occurred. After each seizure a period of apnoea (20 to 40 seconds) was noted and alarming cyanosis developed. Potassium chloride, 2 gm. in 500 cc. of saline, was then administered subcutaneously. The convulsions ceased 30 minutes after the potassium chloride was given. Coma persisted for 29 hours after which consciousness was regained. The next day signs indicating lobar pneumonia were noted. Four days later death occurred.

Autopsy * revealed pneumonia and cloudy swelling of the viscera. The central nervous system showed no gross changes. On microscopic examination focal areas of encephalomalacea were noted in the basal nuclei with infiltration by microglia and, peripherally, gliosis. Iron imbibition was apparent in the blood vessels of this area. Corpora amylacea were seen in the medulla.

CASE 6.—M. J., colored female, age 30 (approximate), admitted to the University Hospital Dec. 23, 1939, with diagnosis of schizophrenia, catatonic type. The seventh administration of insulin (70 units) was made Jan. 12 at 7 a. m. At 10 a. m. the patient became violently disturbed and apparently delirious. At 10.30 a. m. sodium luminal, 3 gr. intravenously, was given and the noisy activity subsided. Shortly after 11 a. m. a mild coma was apparent. At 11.40 a. m. 75 cc. of 50 per cent glucose was given intravenously. The corneal reflexes were present. The diminution of consciousness was so slight that the patient pulled her arm away irritably when an attempt was made to insert the needle. Since no immediate response occurred the same amount of glucose was again given intravenously after 20 minutes (12 noon). At 12.30 p. m. the respiration became stertorous and labored. Marked torsion spasms occurred. Definite signs of laryngeal spasm were apparent. Adrenalin and atropin were given and the signs of pulmonary edema and laryngeal spasms promptly subsided. Additional glucose was given by nasal tube and intravenously, also large amounts of thiamin chloride. Coma persisted for three hours and a half after which consciousness gradually returned.

Comment.—All six of these cases showed in varying degrees the reaction called by most observers prolonged coma or non-hypoglycemic coma. The general status of these patients, all of whom failed to awaken with the usual promptness after the administration of glucose, impressed us as differing widely. The non-hypo-

*For this material the writers are indebted to Dr. E. R. Pund and the department of pathology, School of Medicine, University of Georgia, Augusta, Ga.

glycemic comatose periods varied from three hours and a half to almost ten days. Two of the patients died, one from what appeared to be peripheral vascular collapse although early lobular pneumonia was a complication. The other apparently died from pneumonia which was perhaps indirectly related to the prolonged coma. The physiologic and psychologic state of the patients during their periods of disturbed consciousness which followed the hypoglycemic comas varied remarkably. Some of them (2, 5, 6) showed the torsion spasms and convulsive seizures often described by other observers.¹⁴ Three of the cases (3, 5, 6) showed pulmonary edema which developed early, within the first hour of the non-hypoglycemic comas. One case (6) developed laryngeal spasm. None of these cases showed other neurologic signs. Nearly all cases reported by other observers are described as showing positive signs of neurologic dysfunction. In most of our cases a sharp elevation of temperature during the first few hours of protracted coma was recorded. This is in keeping with the observations of others.^{13, 14, 15} The most puzzling case in the series (1) on the other hand showed no abnormal elevation of temperature until after the non-hypoglycemic coma had persisted for more than 24 hours. Then the rise was very slight (101.6 R.). During the next four days she showed no appreciable elevation. Her blood pressure remained normal. Furthermore she was entirely free from all neurologic signs until a few hours preceding death. For six days she lay quiet, responded even to mild stimuli and scarcely seemed to be comatose in the ordinary sense. During this period she was not only free from elicitable signs of neurologic disorder but also without evidence of any physical illness.

Discussion.—In reviewing these cases it is difficult to account for their failure to awaken. The patients did not show any of the usually accepted danger signals. They did not appear to have reached a very deep level of comma before glucose was administered. Case 1, whose protracted coma lasted almost ten days and ended in death never lost the corneal reflexes either during the period of hypoglycemia or during the non-hypoglycemic period. None of the cases was allowed to remain in coma unusually long. One case (6) had been comatose scarcely 30 minutes. Her corneal reflexes were active and she responded to stimuli at the time glucose was given to terminate hypoglycemia, pulling her arm away from

the needle. One of the cases (4) was given thiamin chloride and also nicotinic acid prophylactically. None of the patients showed hiccoughing which has recently been reported as occurring prior to protracted coma.¹⁶ In view of the fact that it has often been suggested that failure to awaken from coma depends on the depth of coma, it may be profitable to seek some standards for what constitutes mild, moderate and deep coma. Sakel has said that the cremasteric reflex first disappears, the Babinski sign later ushering in coma, while the corneal reflex is retained longest.¹⁷ Heiman, on the other hand, in studying the relation of the Babinski sign to degrees of hypoglycemic coma noted that it was sometimes found prior to any coma at all and that often it did not appear even in relatively deep coma. He concluded that the Babinski sign was of no significance in determining the stage of coma.¹⁸ On the basis of his studies Heiman concluded that the corneal reflex is a reliable sign for determining a satisfactory state of coma. Wilson reported that the patient should be considered in coma when the corneal reflexes are lost and in deep coma when the pupillary reflexes are lost.¹⁹ Vander Veer and Reese, on the other hand, state that the patient should be considered in coma when he no longer gives evidence of recognizing and understanding the nature of stimuli applied to him.²⁰ Gillman and Parfitt consider loss of corneal reflex and extensor or plantar flexion as marking the onset of definite coma.²¹ Rossman and Cline speak of three stages of coma: (1) Light coma when the patient is out of contact but retains superficial reflexes; (2) moderate coma when superficial reflexes are lost, Babinski is present, corneal reflexes are sluggish; (3) deep coma when corneal reflexes are lost.

Osterman²³ states that the onset of deep shock is denoted by the appearance of either muscular twitching and motor disturbances or the beginning of a lapse into unconsciousness. According to the criteria of some observers Case 1, who died after almost ten days of coma, could not be considered as having ever entered hypoglycemic coma at all. According to many other observers she could be regarded as having reached only a stage of light coma or, at most, of moderate coma. In fact only one of these cases lost the corneal reflex during the hypoglycemic period. According to our own experience the Babinski sign and muscular twitching are

of no value in determining the degree of coma since these phenomena often appear while the patient is clearly conscious.

Since it is believed by some observers that non-awakening depends on excessive prolongation of hypoglycemic coma¹¹ it is important to determine what constitutes a safe length of time for the patient to be left in hypoglycemic coma. Wilson¹⁹ states that many patients remain in full coma from 2 to 2½ hours. The criterion for deep coma, as has been stated, is given by this observer as loss of pupillary reflexes. Easton²⁴ states that many patients may be safely left in coma for 2½ hours. Reese and Vander Veer²⁵ state, "We usually allow the deep comatose wet shock to continue from 2 to 3 hours provided the total period of hypoglycemia has not exceeded 6 hours. Lipschutz²⁶ advises that patients not be left in deep coma longer than 2 hours. Vander Veer and Reese²⁰ again warn against leaving the patient in hypoglycemic coma over 3 hours. Kraulis, on the other hand, reports that his patients are kept in deep hypoglycemic coma for periods up to 6 hours, small amounts of sugar being administered but not in sufficient quantities to interrupt the coma.²⁷ It may be noted that none of our cases was allowed to remain in hypoglycemic coma longer than 2 hours and 15 minutes and that one (6) had not been comatose more than ½ hour.

Therapy.—It is, of course, necessary to supply the patient with sufficient sugar to keep the blood glucose at a normal level. Freudenberg believes that the failure to awaken is due to a deficiency of thiamin chloride and reports successful interruption of prolonged coma by the administration of thiamin.^{1, 28} Thiamin chloride was administered subcutaneously, intravenously and sometimes intrathecally without any apparent effect in our cases. Prophylactic administration of thiamin chloride, as recommended by Freudenberg, was carried out with Case 4. Nicotinic acid was also administered prophylactically. Despite these measures prolonged coma developed. Wortis and Lambert¹¹ make the point that because of gastric retention sugar administered by nasal tube may remain in the stomach and not be absorbed, the patient sometimes remaining in hypoglycemia for many hours after sugar is given by nasal tube. Since the first glucose was given intravenously in Case 6 and within 45 minutes after the administration by nasal tube in all the other cases except one (1), the hypothesis of a gastric retention

would scarcely explain the failure to awaken. Wortis and Lambert advise blood transfusion and report successful termination of prolonged coma by this measure. We have not yet had occasion to use transfusion since the only case of prolonged coma subsequent to the report by Wortis and Lambert aroused before the transfusion could be carried out.

The possibility should not be overlooked that changes in serum potassium or in potassium concentration elsewhere in the body may play a part in the failure of a patient to awaken. Harris²⁹ and his co-workers noted a marked lowering of serum potassium during hypoglycemia in certain patients receiving insulin therapy. The extent of the fall in potassium was apparently not dependent on the amount of insulin given. These observers felt that coma was deeper and shock more severe in the patients who had lower potassium levels than in others. The studies of Gammon and his co-workers³⁰ furnish strong evidence that familial periodic paralysis is associated with a fall in serum potassium and that the administration of potassium relieves the attacks. In some patients in whom the attacks of paralysis occurred the serum potassium was lowered only 10 per cent. Insulin administration has been found to lower serum potassium as much as 30 per cent or more in some cases. Rusk and his co-workers³¹ in their studies of allergic states report that serum potassium is not only lowered by insulin but also by the ingestion of glucose. A fall in serum potassium of 10 per cent is mentioned after ingestion of 100 gm. of glucose. Such observations suggest that in insulin therapy of the psychoses it is quite possible that the administration of insulin may cause an initial fall in serum potassium and administration of glucose subsequently, to terminate the hypoglycemia, may cause an additional and cumulative fall. Pudenz and his co-workers³² also report a fall in serum potassium with onset of attacks of periodic paralysis and find that the administration of potassium chloride relieves the paralysis. These observers also report that serum potassium remains low after the administration of potassium chloride indicating that "the injected potassium is leaving the serum and going elsewhere" in the body. These observers give very convincing evidence that it is not the paralyzed muscles which need the potassium but the central nervous system. Such observations as those mentioned above lead one to suspect that some disturbance in potassium

metabolism might be related to the failure of patients to arouse when hypoglycemia is terminated. We therefore administered potassium chloride as mentioned above in one case (5). This patient was having severe seizures every ten minutes at the time potassium chloride was administered and was apparently in a critically dangerous condition. The seizures promptly ceased after the potassium chloride was given. Cyanosis disappeared, respiration became normal and the general physical condition improved remarkably. The patient did not, however, arouse from coma until many hours later. Only a single administration (2 gm.) of potassium chloride was given. Although it cannot be definitely stated on the basis of this one observation that the patient's improvement and the cessation of the seizures were caused by potassium chloride, we can state that this is the first instance in our experience where any medication or procedure has been followed by such a prompt and definite change.

The report by Dragstedt and his co-workers³³ of observations on the significance of lipocaic suggests interesting possibilities. These observations indicate strongly that a deficiency of this second internal secretion from the pancreas (lipocaic) results in a failure of fat metabolism with fatty degeneration of the liver, fall in blood fats and, finally, death. They report that in depancreatized dogs which have been given insulin for several weeks and which have been subjected to lipocaic deficiency alone, even very small doses of insulin may cause convulsions.³⁴ Under such conditions it is necessary to decrease the dose of insulin progressively. It would appear to be possible that the administration of large doses of insulin, such as are given in the hypoglycemic treatment of the psychoses, over a considerable period of time might tend not only to retard the natural production of insulin but perhaps also to diminish production of lipocaic. The fact that one of our two cases who died showed fatty degeneration of the liver might be regarded as a suggestive indication that such a process occurred.

SUMMARY AND CONCLUSIONS.

No adequate explanation can be offered by us for the occurrence of prolonged non-hypoglycemic coma in the six cases reported. Intensive treatment with thiamin chloride, nicotinic acid and with riboflavin failed to terminate the coma. Nicotinic acid apparently

brought about a striking change in Case 2. This effect was not, however, on the initial coma but on a state of confusion associated with redness of the tongue many days after the coma had subsided. Despite prophylactic administration of these vitamins, which play important rôles in carbohydrate oxidation and in the absence of recognized signs of danger, patients undergoing insulin shock therapy sometimes fail to awaken from hypoglycemic coma when the hypoglycemia is terminated. This distressing complication sometimes arises even in patients who have not reached a level of deep coma or shock and who have been in coma or shock only for very short periods.

Though nearly all of the procedures recommended in this emergency were carried out, no favorable effect was noted except in one instance when potassium chloride administration was followed by a prompt cessation of severe convulsive activity.

Prolonged coma is to be regarded as a serious complication which not infrequently terminates fatally. Aside from pulmonary edema it has been the only dangerous complication that we have experienced in the use of insulin shock therapy.

In the two reported cases which came to autopsy no adequate cause could be found for the failure to awaken.

The status of patients in prolonged coma varies widely. Some may show only a mildly clouded consciousness and appear to be in excellent physical condition for many days but nevertheless proceed to a fatal termination.

Since prolonged coma is at present an unpredictable complication and a very dangerous condition, opportunities to devise therapy are sporadic and limited. It seems worth while to make use of any harmless measure that offers a chance of success even on purely theoretical grounds. We therefore feel that it would be advisable to administer potassium to all patients who develop this complication. The possibility of favorable results from the use of lipocaic should be investigated. It is suggested that this preparation be used in cases of prolonged coma, on theoretical grounds, whenever the occasion arises.

Since riboflavin and nicotinic acid are no less important in carbohydrate metabolism than thiamin chloride and since the demand for them is also increased during insulin therapy it is suggested that they, as well as thiamin chloride, be used prophylactically in all cases undergoing treatment.

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THE INTERNAL ENVIRONMENT AND BEHAVIOR.*

PART I. INTRODUCTION AND THE RÔLE OF OXYGEN.

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Introduction.—The great French physiologist, Claude Bernard, as early as 1860, stated that there are two environments for complex living beings—a general environment which is the same as that for inanimate objects and which surrounds the organism as a whole, and an internal environment in which the living elements of the body find their optimal habitat. He first regarded the plasma of the blood as the sole *milieu interne* but later he spoke of both the plasma and the lymph. Finally, in his treatise on the phenomena of life, he referred to it as “the totality of the circulating fluids of the organism.” Bernard believed that the internal environment was not only a vehicle for carrying nourishment to cells hidden away in the deeper tissues and for bringing away from these cells the products of excretion, but also that it was under the control of agencies which keep it remarkably constant. He clearly perceived that insofar as that constancy was maintained, the organism was free from external vicissitudes. “It is the fixity of the *milieu interieur* which is the condition of free and independent life,” he wrote, and “all the vital mechanisms, however varied they may be, have only one object, that of preserving constant the conditions of life in the internal environment.” Bernard listed oxygen, water, temperature and nutrient supplies (including salts, fats and sugar) as the necessary constants which free the organism from the limitations set by the external world.

Bernard's conception of the internal environment and its constancy exerted a profound influence on subsequent research, especially on the English physiologists, Haldane and Barcroft. The former was so impressed by the above quotation from Bernard as

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to state "no more pregnant sentence was ever framed by a physiologist." Haldane devoted a lifetime of research to the demonstration of this principle in the field of respiration. His most important contribution was an elucidation of the way the respiratory center responds to variations in carbon dioxide and oxygen.¹²

Barcroft was equally impressed by Bernard's concept of "the constancy of the internal environment as the condition of the free life" and asked the pertinent question for the psychologist or the psychiatrist: "Freedom for what?" In Barcroft's opinion, it is chiefly freedom for the activity of the higher levels of the nervous system, especially the cerebral cortex. Barcroft says that the organism in gaining constancy of temperature, hydrogen-ion concentration, sugar, salt, water, oxygen and certain other organic constants ultimately reached a stage of development so man's higher faculties could develop.² The constancy of the internal environment is most exact in man and also in man the free life reaches its highest development. The alternative to this freedom would be either submission to the checks and hindrances of external cold, internal heat, or disturbances of any other constants, or, on the other hand, such conscious attention to storage of materials and to altering the rate of bodily processes in order to preserve constancy that time for other affairs would be lacking. The full development and ample expression of human personality has been made possible by the automatic regulation of the internal constants so that intelligence, imagination, insight and manual skill are set free for higher services.

Numerous illustrations of the way in which behavior may be determined by variations in the internal environment can be found in the experiments of Cannon.⁷ He believes that the coordinated physiological processes which maintain most of the steady states in the organism are so complex and so peculiar to living beings as to warrant a special designation for these states; namely, *homeostasis*. Cannon has shown that the modes of storage and release and the speeding up and slowing down of continuous processes which maintain the constancy of the internal environment are not as a rule controlled by the cortex. It is a special part of the autonomic nervous system—the sympathico-adrenal division—which is charged with the performance of these functions without conscious direction. Whether the sympathico-adrenal division is

aroused by pain or excitement, by muscular effort, asphyxia or low blood pressure, by cold or hypoglycemia the presenting situation is one in which the constancy of the fluid matrix is endangered. In each of these contingencies, the operation of the system is such as to favor the welfare of the organism by preserving homeostasis.

An excellent illustration of an attempt to describe the interrelationship of some of the constituents of the blood has been made by L. J. Henderson by means of a D'Ocagne nomogram or line chart.¹⁸ From this nomogram one can ascertain with considerable accuracy the effects of alterations in any one of the variables upon the others. The variables considered (oxygen, carbon dioxide, bicarbonate, pH and hemoglobin) were those which appeared to be most important in the description of the blood as a physico-chemical system. Many substances (*e. g.*, glucose) which are essential to the functioning of the central nervous system and to the organism as a whole are omitted because their immediate rôle is a minor one from the point of view of physical chemistry. Henderson's work is an outstanding example of the exact description of a set of interrelated variables in the internal environment. No such exhaustive treatment has been made of the variables involved in the proper functioning of the central nervous system, yet such an analysis might prove to be of great value if reliable experimental techniques could be evolved.

The purpose of this symposium is to discuss the relationships between the internal environment and behavior, especially the rôle of oxygen, glucose, water and temperature, the acid base and internal secretions. Although the organism has a remarkable facility for adjusting to alterations in regard to these substances, striking effects are manifested if certain limits are exceeded. As Barcroft and others have indicated, the most significant effects of low oxygen tensions or low blood sugar levels are on the more complex or higher centers of the cortex. If any normal person is subjected to a sufficient degree of oxygen want, there is an insidious and progressive loss of reasoning, judgment and insight. Research in this direction may help the psychiatrist to understand the still unsolved problem of the loss of insight in psychotic patients, or the unusual behavior of the neurotic. It is equally true that sensation and perception are altered by anoxia or hypoglycemia. The experimental psychologist may be rewarded by using such an ap-

proach. He may be able to understand more precisely the basic physiological mechanisms underlying sensory and perceptual processes, whether they are restricted or diffused in extent, central or peripheral in locus, and chemical or electrochemical in nature. The application to applied fields in industry is very direct. It applies to the development of tests of fitness and specific aptitudes where the mechanism of adaptation of the internal *milieu* are subjected to special stresses. Such studies are especially relevant to aviation where airmen encounter lack of oxygen at high altitude; also in other industries where men work under stress such as in the steel mills where there may be excessive loss of salt in the perspiration due to intense heat or where there may be a depletion of the carbohydrate reserves due to excessive muscular activity.

The Rôle of Oxygen.—One of the most sensitive and direct ways of demonstrating the constancy of the internal environment, as well as the way in which psychological phenomena are directly dependent upon the underlying physiological processes, is to deprive the organism of oxygen. There is no storage of this gas in the organism, with the possible exception of the splenic reservoir, so that without oxygen one will collapse within a few minutes. All the tissues of the body are affected by variations in the tension of oxygen or of carbon dioxide but certain organs appear to be more sensitive than others. The brain, for instance, is much more sensitive to anoxia than the smooth muscles, and certain experiments indicate that the cortex is more sensitive than other brain tissue. For example, it has been demonstrated in animals by Heymans,¹⁴ Cannon,⁸ and others that cortical tissue does not recover if it is deprived of oxygen for more than 5 to 8 minutes while in certain other parts of the brain and spinal cord, irreversible changes do not begin to occur for periods as long as 20 to 30 minutes. Smooth muscle can apparently go without oxygen for hours and still survive. In the case of most variables in the internal *milieu* buffer systems or stores render them relatively independent of environmental changes. Temperature changes, for example, can be quite large without producing permanent damage. In the case of oxygen, however, this is not true. Here the organism lives on a hand-to-mouth basis and cortical tissue is especially vulnerable to permanent injury. There appears to be some experimental evidence, therefore, for Barcroft's theory that the cortex, or more recently

acquired brain tissue in an evolutionary sense, is more easily disrupted by alterations in the internal environment than other tissue.

The reaction of the sympathico-adrenal system in the presence of oxygen want affords a striking illustration of the prompt and automatic adjustments which preserve the constancy of the internal environment. The aviator or the mountaineer, for example, encounter a lowered oxygen pressure at high altitude and therefore the oxygen tension in the blood is lowered and the cells of the body suffer. If such a condition arises the organism lacks oxygen to burn the nonvolatile acids which are constantly being produced by these cells. If the blood, which is mildly alkaline, becomes acid, even to a slight degree, coma supervenes and often death. If oxygen is supplied, however, the nonvolatile acids are oxidized and the resulting carbonic acid being volatile is readily eliminated via the lungs. In the presence of an adequate oxygen supply the hazards of severe acidosis are avoided. Adjustments which work toward that end occur in the heart, blood vessels and spleen. The heart is made to beat more rapidly and the blood vessels are constricted in certain parts of the body, with the consequence that the arterial blood pressure is raised; and under the higher head of arterial pressure, there is a more favorable redistribution of blood. Simultaneously, by contraction of the spleen, extra corpuscles are forced from storage in that organ out into general circulation as conveyors of oxygen. The increased heart rate and the vascular constriction and the squeezing of the spleen are all results of sympathico-adrenal functions. Cannon has observed that sympathectomized animals faint or collapse in a relatively short time when exposed to low oxygen tensions.⁷ Neurotic patients with clinical signs of sympathico-adrenal disturbance also appear to be unusually sensitive to lack of oxygen.²⁰

Comparison of the Effects of Anoxia during Rapid and Slow Ascents to High Altitude.—Many years ago Paul Bert demonstrated that the important physiological variable at high altitude is the diminished partial pressure, and consequent lessened amount of oxygen available for the organism.⁴ In a famous series of experiments with birds and animals in bell jars and with humans in low pressure chambers, Bert demonstrated that organisms were not impaired by the change in total pressure if they received a normal concentration of oxygen through a tube from a cylinder

outside. Haldane, Leonard Hill and others have successfully repeated Bert's experiments in low pressure chambers showing that the change in total pressure does not become an important variable for the average subject below approximately 30,000 to 35,000 feet. The essential features of high altitude can, therefore, be studied at sea level by methods which control only the partial pressure of oxygen (*i. e.*, percentage) as in a low oxygen chamber, rebreathing devices and large Douglas bags. In low pressure chambers the effects of high altitude can be exactly reproduced at sea level. It is questionable whether the result obtained in low oxygen chambers and with rebreathing devices are comparable

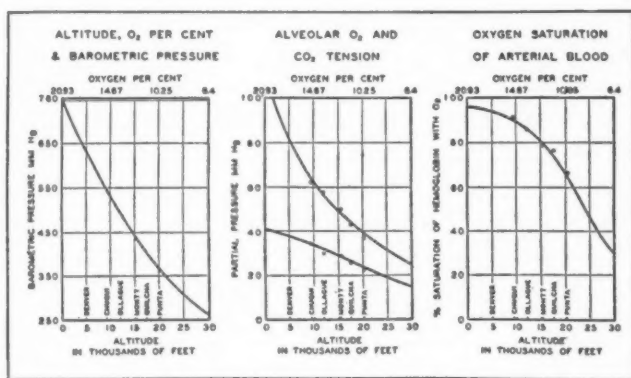


FIG. 1.

in every detail to the data from low pressure experiments and actual ascents to high altitude, either by plane or mountain ascents, because of unknown effects of the change in total pressure on circulation, tissue oxidation, and the central nervous system. The most satisfactory method for studying problems of adaptation is to live at high altitude on a mountain where more normal living conditions can be maintained over long periods of time. Fig. 1 shows the changes in barometric pressure, the alveolar oxygen and carbon dioxide tension and the oxygen saturation of the arterial blood in relation to altitude based upon data from various high altitude studies.^{9, 17}

The characteristics of the psychological changes induced by anoxia depend upon the rapidity and the extent to which the oxy-

gen pressure is reduced; *i. e.*, the rate of ascent and altitude attained, as well as the length of the exposure and the physiological characteristics of the individual, such as age, physical fitness, freedom from fatigue or narcotics. The psychological changes reflect the degree of organic deterioration, provided the subject does not attempt to compensate for this by exerting greater effort. As a result of the rebreathing experiments in testing pilots for altitude fitness during the World War, Dunlap stated that "the basic and important psychologic effects of oxygen deficiency are on voluntary sensorimotor coordination and attention. Until asphyxiation reaches the stage in which the integrative mechanism is rapidly approaching the condition of complete failure, no effects are demonstrable. Discriminative judgment and memory are apparently not affected, except as the inability to attend to the details in learning, or inability to control the muscular mechanism of expression, may enter.¹⁸ We have observed that Dunlap's interpretation holds only for acute experiments of short duration. In the rebreathing experiments with pilots, the oxygen was reduced from 20.94 per cent oxygen (sea level) to approximately 9 to 7 per cent (corresponding roughly to 22,000 to 27,000 feet) in 20 to 30 minutes. In these experiments the anoxia was induced too rapidly and for too short a duration. They gave a false impression of the average subject's tolerance, since the pilots who desired to do well exerted great effort to maintain their reactions as long as possible and concealed many of the most significant and interesting effects of oxygen want.

If anoxia is produced suddenly, as in an airplane ascent, the psychological effects are insidious and often overlooked. At first there may be a feeling of well-being, but this stage gradually passes almost unnoticed into sensory dullness and mental lethargy. When the partial pressure of oxygen is reduced one-third, *i. e.*, from 160 to 110 mm. or to approximately 12,500 feet, the aviator may be conscious of a headache, alteration in the breathing and, a little higher, in the great muscular effort necessary for moving. The *cyanosis* due to diminished arterial oxygen saturation is marked at 80 mm. of oxygen or 20,000 feet altitude where marked sensory and mental incapacity is observed. Many experience a desire to sleep and fainting is not uncommon. In spite of obviously foolish reactions, one feels quite confident that one's mind is clear and one's judg-

ment sound. The upper limit for consciousness in unacclimatized man during short exposures appears to be between 23,000 and 25,000 feet. There appears to be a definite order in which psychological changes may occur. Certain visual functions and finer tremors are observed early while hearing is maintained until the final stages of anoxia.

If anoxia is produced more slowly as in climbing or ascending by train, the initial effect may be one of stimulation. This may be due to over-compensation to the oxygen lack. When the traveler arrives, for example, at Ticlio (15,600 feet) from Lima, Peru, in about eight hours, he may feel excited, often showing a disposition to be talkative, or he may feel depressed and quarrelsome.¹⁷ If he remains for an hour or two, the cyanosis may become marked, he is unusually sensitive to cold, feels lightheaded and he may have a headache. During a longer sojourn, mountain sickness may occur, locally known in South America as "soroche" or "puna." Lassitude is felt; the frontal headache becomes worse; appetite fails; nausea and vomiting may occur and frequently there is a sense of oppression in the chest and a rapid pulse. Following a night of disturbed sleep, associated with irregular breathing and frequently fantastic dreams, the eyes are dull and heavy, the temperature subnormal, the tongue furred and the bowels disturbed. The condition may last a day or two, but if the patient remains quiet he may become acclimatized fairly rapidly. A person may be able to remain there for long periods of time and be fairly comfortable, but on going still higher the symptoms reappear. Mountain climbers who venture far beyond 20,000 feet in the Himalayan regions must attain a certain degree of acclimatization at each station before going higher. Also the major part of the climbing must be done within a few weeks or months at such great heights because fatigue and deterioration become excessive.

The highest permanent habitation is apparently in the mining communities of South America between 17,000 to 18,000 feet. The sulphur miners at 17,500 feet in the Andes studied by the members of the Chilean Expedition are of interest since they apparently form the highest permanent community in the world.¹⁷ Approximately 100 men live there all year with their wives and children. On one occasion they attempted to establish their camp at 18,500 feet nearer the sulphur deposits, but they found it impos-

sible to sleep and general physical deterioration set in. They now live apparently quite comfortably at 17,500 and walk each day to the mine at 19,000 feet. They often run down to the lower camp following a long day of work at the mine and after their evening meal play soccer until dark. These observations are in general agreement with Campbell's studies of animals in low oxygen chambers at sea level. He found that they were unable to acclimatize to 10 per cent oxygen simulating 20,000 feet altitude.⁶

Studies of reproduction in the Andean regions are of interest relative to the problems involved in the constancy of the internal environment. The women in the mining community mentioned above can apparently conceive their children at the camp at 17,500 feet, but they must go to lower altitudes to bear them. Soon after birth, they return to the high altitude. The early records of the Spaniards in the Andes indicate that they were unable to have children and that miscarriages and still births were frequent compared with the prolificacy of the more acclimatized natives (*cf.* Monge, 26). In 1535, the capital of Peru was transferred from Jauja (10,500 feet) to Lima (sea level) because so many horses, pigs and hens died at birth at the high altitude. The mechanisms which enabled the Spaniards to become adapted were apparently established quite slowly for the first Spaniard born at the mining community at Potosi Boliva (14,000 feet) occurred 58 years after the founding of the city. In the light of these observations, no better illustration of the maintenance of constancy in the internal environment can be found than Barcroft's studies of the foetal behavior. He has observed that the oxygen saturation of the foetus is unusually low and that birth is really a struggle to preserve the constancy of the internal state of the organism in obtaining more oxygen.

The Psychological Effects of Anoxia.—In analyzing more concretely the psychological changes due to anoxia three kinds of experiments, differing widely in complexity, will be briefly discussed: (1) finer tremors and loss of motor coordination as in handwriting; (2) memory, especially for recent events; and (3) light sensitivity.

Neuro-muscular Reactions.—The objection is often raised that the psychological effects of anoxia may be concealed by the subject if greater effort is exerted. In attempting to control this

variable, tests have been selected in which the responses are not under the conscious control of the subject, such as in photographing the eye movements while reading.²⁵ The technique involves the recording on a moving picture film a beam of light reflected from the cornea of the eye while fixating on a dot or in reading printed lines from the page of a book. Under low oxygen, fine tremors were revealed while fixating on dots and there was a diminished precision in the adequacy of ocular fixations while reading. The extent and characteristics of these ocular motor anomalies were unknown to the subjects.

Tremors of eyelids, fingers and other parts of the body are observed during sudden exposure to anoxia simulating 16,000 to 18,000 feet altitude. With more extreme oxygen lack, ataxia, muscular rigidity and tonic-clonic cramps are commonly observed. One subject, for example, while inhaling 8.5 per cent oxygen was unable to make the movements necessary to complete a simple form-board test. His eyes were fixated on the blocks, but his movements were too jerky and his fingers too rigid to return them to their proper places. He knew where they should be placed but his motor reactions were too impaired to carry out the task. The symptom disappeared immediately upon inhaling oxygen.²⁰

A simple method of following the deterioration of motor functions is to observe the handwriting of a subject during progressive oxygen deprivation. Fig. 2 shows the handwriting of two subjects during acute low oxygen experiments. The handwriting on the left hand side of the figure was made while inhaling percentages of oxygen corresponding roughly from 22,000 feet to 26,000 feet.¹⁶ The handwriting at the right was made by one of Hill's subjects in a low pressure chamber at a simulated altitude of 37,000 feet and later at 30,000 feet while breathing 100 per cent O₂ from a tube extending outside the chamber.¹⁵ The subject whose writing is shown at the left was very amused during the test and wrote that he felt cheerful and quite all right except for occasional temporary blanks. At 23,000 feet (8.5 per cent oxygen) he began to omit letters from common words and his writing became quite illegible. He complained of his feet feeling a long way off and of his inability to orient other parts of his body. At 26,000 feet (7.4 per cent oxygen) he was greatly incapacitated and yet he appeared to be cheerful and was well satisfied with his performance. He became

quite annoyed when he was removed from the apparatus and insisted that he could go much higher. He was convinced of his marked deterioration only after seeing his handwriting. The insidious loss of insight as to the nature and the extent of his own deterioration was one of the most significant aspects of the experiment.

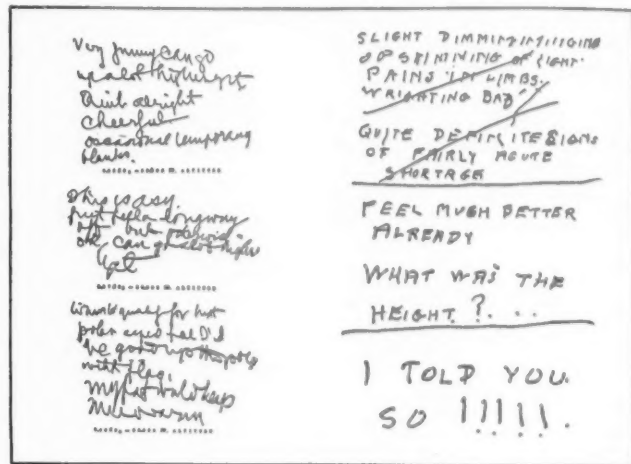


FIG. 2.

Memory.—Many of the more subtle and complex aspects of one's mental processes are altered by anoxia as well as simpler motor activity. As in the more acute stages of exhaustion and fatigue, one's mind becomes less flexible, one's attention distractible, alternating frequently from one thing or idea to another, and one's memory for recent events more limited. On the Chilean Expedition, for example, we observed that the usual procedure at sea level of recording the pulse rate at fifteen-second intervals over a period of one or two minutes had to be changed so that the data was tabulated at once.¹⁷ Standardized memory tests on this expedition revealed significant impairment at 15,500 feet and above. The procedure was as follows: a series of ten pairs of four-letter words were exposed for fifteen seconds each. The subject was then shown the first word of each pair in the same order as prescribed and he was instructed to give the second. There were no obvious

or meaningful associations between each pair. The average number of words recalled and the number of wrong associations at each altitude are shown graphically in Fig. 3. The impairment at 20,000 feet was very marked, especially the tendency to repeat a word from the beginning of the series over and over again.

In unacclimatized subjects tested in low oxygen chambers at sea level, significant differences in memory were observed at simu-

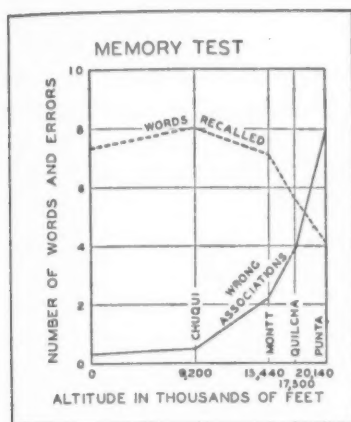


FIG. 3.

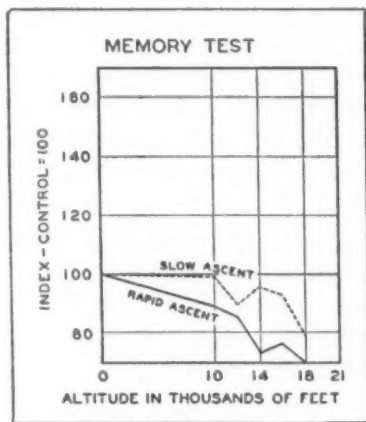


FIG. 4.

lated altitudes as low as 10,000 feet during rapid ascents (15 minutes) and at 12,000 feet during slow ascents (one hour and 15 minutes) (*cf.* Fig. 4). Studies of this function showed that the average college student at sea level can remember 8 to 9 out of 10 of these paired words. While inhaling oxygen percentages simulating 10,000 to 12,000 feet he is impaired approximately 10-15 per cent.¹⁸ We have observed that the average college student may even excel his professor of 55 to 60 years of age. This is probably due to the well known loss of ability for immediate memory associated with age. Although these variations in memory may be caused by many complex factors, the suggestion that they are due to changes in oxidation and circulation opens up a new approach for research.

Light Sensitivity.—The techniques for measuring the sensory impairment associated with anoxia are more precise than in motor

and mental functions. In vision, for example, the alterations can be followed by standard psychophysical procedures.⁵ Certain visual functions, such as light sensitivity, are affected more easily than others such as visual acuity or the visual fields.²² Pilots have frequently reported a general darkening of the visual field while flying at great heights without oxygen (18,000 feet and above). In Douglas bag experiments in the laboratory, we have noticed dimming of the lights during sudden exposure to partial pressures of oxygen simulating altitudes of from 12,000 to 14,000 feet and a marked increase in the brightness of lights on being quickly changed back to room air. These phenomena of the darkening of the visual field have been subjected to precise measurement by the usual procedures of studying light sensitivity or night blindness with the Hecht adaptometer.²³ The thresholds indicate precisely the return of the capacity to see in the dark following exposure to a light of high intensity. The dark adaptation curves were first determined in the low oxygen chambers at sea level and then at various simulated altitudes. Both the rod and cone portions of the curves were elevated progressively with increasing anoxia. Some subjects were affected at altitudes simulating 7,400 feet while all showed changes at 12,000 feet or above. At 20,000 feet, as shown in Fig. 5, the final rod threshold was raised by a factor of 5.8. These changes were immediately abolished upon administration of oxygen. The effect is attributable to neural elements of the retina and central nervous system rather than to the regeneration of the photo-chemical substances of the retina since the thresholds continued to rise with increasing oxygen lack even in the completely dark-adapted eye. Furthermore, the recovery of light sensitivity is much more rapid with oxygen than with any known chemical substance such as vitamin A and the restoration is comparable in time and extent to that observed in other cortical functions such as memory or complex reaction times. These findings indicate a broader basis for visual functions. Dark adaptation appears to be related not only to photo-chemical processes in the retina but oxidation in the nervous tissue plays an important rôle also.

It is well recognized that the brain is less able to burn fats and proteins than other parts of the body and glucose appears to be the main metabolic substrate. A reduction in blood sugar, there-

fore, would be expected to reduce the oxidation in the brain and, if sufficiently advanced, impair sensory and mental functions in the same way as anoxia. In both cases, there is a reduction in oxygen in the nervous tissue so oxidation should be increased by giving glucose in anoxia or oxygen in hypoglycemia.¹¹ Experiments were carried out to test this hypothesis using thresholds of light sensitivity as discussed above as criteria for decreased or increased sensitivity.²³ The blood sugar was lowered by injecting insulin and then the oxygen tension was increased. On other occasions we exposed subjects to low oxygen and then increased the blood sugar.

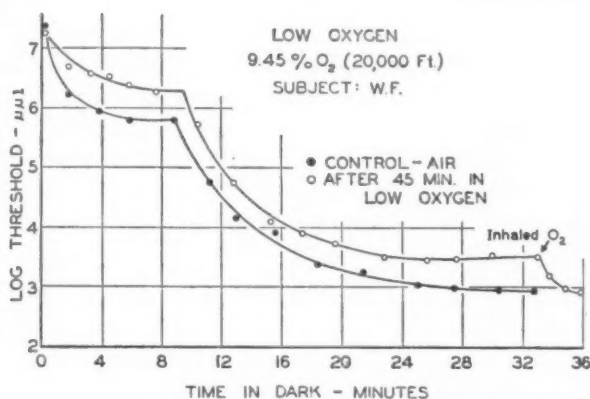


FIG. 5.—Dark adaptation curves in air (solid circles) and in low oxygen (open circles).

Fig. 6 shows that when the blood sugar was lowered by insulin the thresholds increased; when the subjects inhaled oxygen from a cylinder, the thresholds returned to normal; when the subjects were returned to room air the thresholds rose; and finally, when the subjects ingested glucose the thresholds fell. In other experiments, the combined effects of both anoxia and hypoglycemia produced striking impairment. Significant differences in light sensitivity were observed even with minor variations in blood sugar, for example, in comparing results obtained while the subject was in the basal state and after a normal breakfast.

The observations relating to the differences in threshold under basal and non-basal conditions have significant implications in the field of psycho-physics. It is well known that certain psycho-

physical laws dealing with delicate sensory judgments, as in light sensitivity, tend to break down at the extremes of psycho-physical curves.⁵ For example, the relationship between sensation and the logarithm of the intensity of the stimulus throughout an extensive intermediate range is linear. At the lowest or highest values of the stimulus, however, significant departures from linearity are known to exist. Not only does the variability increase so greatly that the smaller differences become statistically insignificant, but also the basis for absolute judgments becomes distorted. The present study illustrates changes in sensitivity at lowest intensities (threshold

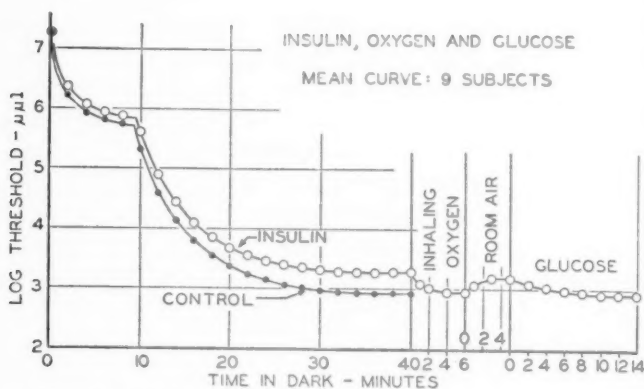


FIG. 6.—The effects of insulin, oxygen and glucose on light sensitivity.

measurements). Similar effects have also been demonstrated for changes at the highest intensities where visual acuity is maximal. If a variation in blood sugar of 20 to 40 mg. per 100 cc. of blood (the usual difference between the basal and the non-basal state) gives rise to a $\Delta \log I$ of 0.31, it would appear that such variables should be controlled. Since raising the tension of carbon dioxide produces a reversible decrease in visual intensity discrimination poor ventilation of the experimental room might also give rise to equally great changes in delicate sensory judgments of light sensitivity.

Alcohol and Oxygen Want.—Frequent references may be found in the studies of anoxia carried out on mountain expeditions, during high altitude flights and in low oxygen chambers to the similarities

in the behavior of a person suffering from oxygen want to one under the influence of alcohol. Barcroft has stated that "acute oxygen want simulates drunkenness, while chronic oxygen want simulates fatigue." Under both conditions a person may become irrational and uninhibited and lose the capacity for self-criticism, memory, sensitivity and motor control. It has been suggested that alcoholism is in fact a form of anoxia (histotoxic) and that "the tissue cells are poisoned in such a manner that they cannot use the oxygen properly." This tends to explain the striking effects of alcohol on the central nervous system, since it is well known that the nervous tissue is particularly sensitive to oxygen want.¹⁹ During the Chilean Expedition discussed above, a study was made of the metabolism of alcohol at high altitude.²⁴ Drinks of alcohol of approximately 1 gram per kilo body weight were ingested at 17,500 feet and at 12,200 feet. The tests were later repeated at sea level. At constant intervals, samples of venous blood were taken for the determination of the concentration of alcohol in the blood, and a series of psychological tests were taken. The concentration of alcohol in the blood rose more rapidly and reached a higher level at high altitudes than at sea level. The relative impairment in the psychological tests was also greater in the mountains compared with sea level after the ingestion of alcohol.

The Rôle of Anoxia in Certain Mental Disorders.—The effects of prolonged exposure to oxygen want, as observed in patients with chronic mountain sickness in the Andes, are of considerable psychiatric interest. These patients present a syndrome unlike any other disease, justifying the presentation of chronic mountain sickness as a distinct disease entity. The disease was first described by Monge.²⁶ In the severe and chronic form of this illness, the patients become cyanotic on the least effort; their faces become blue-violet in color, the skin dry, their fingers clubbed and their thorax emphysematous. They complain of weakness, insomnia, blurring of vision, frequent vertigo and syncope and nausea. Vomiting occurs on the least effort and aphonia is common. The psychological abnormalities are specially noticeable. They exhibit disturbances in emotional behavior, memory and judgment similar to those observed in psychotic patients. One very intelligent engineer, for example, had episodes of marked mental confusion, during which

it was impossible for him to carry out even the simplest calculations. The most striking fact that characterizes this clinical entity is that the symptoms disappear when the patient is brought to sea level and remains there for a short time.

Many of the symptoms discussed by Monge in chronic mountain sickness are similar to those exhibited by certain persons roughly diagnosed as "chronically fatigued neurotic" patients, and also in pilots suffering from "aeroneuroses." Armstrong observed that the outstanding symptoms of such pilots were acute exhaustion and fatigue, shallow, irregular breathing, neurocirculatory failure, nervous irritability, emotional instability, insomnia and gastric distress.¹ This syndrome is frequently observed in pilots on active combat duty where the combined action of the intense emotional stress and prolonged flights at high altitude apparently has a deteriorating effect on the central nervous system. Haldane reported that a common symptom in war patients designated as "shell shock" or neurasthenia was shortness of breath, rapid and shallow breathing and feelings of suffocation, suggesting failure of the respiratory centers. These cases led Haldane to suggest that military neurasthenia was only a more lasting and persistent form of ordinary fatigue and exhaustion due to oxygen want.¹² It is a common observation among clinicians that patients suffering from severe anoxia, as in cardiac insufficiency, neurocirculatory failure, emphysema, pneumonia, carbon monoxide poisoning or acute alcoholism, simulate many of the characteristics of the psychoneurotic or manifest marked mental and emotional abnormalities.

Because of the fact that psychoneurotic patients with marked symptoms of fatigue and exhaustion manifest certain symptoms of oxygen want, their response to high (50 per cent) and low (10 per cent) concentrations of oxygen was studied.²⁰ The experiments were carried out in a chamber where the composition of the gases, the ventilation and the humidity could be carefully controlled. The acclimatization of each subject was followed in terms of the pulse and blood pressure records, as well as their response to sensory, motor and mental tests. The patients appeared to be more severely impaired in the diminished tensions of oxygen than the control subjects; approximately 70 per cent of them collapsed in an atmosphere of 10 per cent oxygen (19,000 feet), whereas this

occurred in only 14 per cent of the control subjects. In the 50 per cent oxygen series, the physiological complaints of the patients, such as headaches and respiratory abnormalities, were less marked. Also the patients, on the average, made better scores in the psychological tests in the high oxygen series, while the control subjects, as a group, showed no change. Whatever the cause of the illness in these patients may be, there is a significant amount of unfitness to account for their complaints of fatigue and exhaustion once they go through a period of chronic emotional stress. It is often suggested that they have impaired sympathetic nervous systems. These experiments offer some evidence for this view, since the mechanisms involved in adaptation to oxygen lack are closely related to the functions of the sympathico-adrenal system. It is a common observation among pilots that "nervous" passengers are more susceptible to high altitude and are more apt to faint. Normal subjects following the loss of sleep were also more sensitive to the effects of oxygen deprivation.

Numerous studies have suggested that anoxia may be a factor in certain forms of schizophrenia and this question has been studied from many angles. The oxygen consumption has generally been reported to be below average and in some patients, definitely subnormal. Many schizophrenic patients show a diminished excitability of the respiratory center to carbon dioxide inhalations. In catatonia the respiration is often characterized by shallow abdominal breathing. Studies of the oxygen saturation however have usually shown values within the normal range of variation. Certain deficiencies have been reported of the catalytic agents involved in the utilization of oxygen by the tissues such as iron and neutral sulphur as well as a slight decrease in the respiratory quotient of the brain. The extent of these abnormalities have been too small to account for significant alterations in the mental behavior of such patients. Therapeutic attempts in schizophrenia with excess oxygen and carbon dioxide have not met with striking success. The various shock therapies involving hypoglycemia and anoxia no doubt reduce the rate of oxidation in the central nervous system and stimulate the sympathetic centers to greater activity. As indicated above the cortical tissue is especially sensitive to anoxia and the beneficial effects of these treatments, if any, may be due to the temporary or permanent alteration of cortical tissue. Con-

vincing evidence is yet to be obtained that impaired oxidation is of primary importance in schizophrenia.

SUMMARY.

In this paper the importance of constancy in the internal environment for the stability and well being of the organism as a whole and the cerebral cortex in particular has been emphasized. Numerous illustrations were cited from studies at high altitude to demonstrate the basic rôle of oxygen in neural activity. The way in which psychological functions can be altered by changes in the oxygen tension was illustrated by reference to specific experiments in neuro-muscular control, memory and light sensitivity. The results showed in striking fashion how sensitive psycho-physiological processes are to oxygen changes in the internal environment. The application of these observations and experimental findings were then discussed in relation to certain mental disorders. By placing these familiar psychological and psychiatric problems in this new setting they are seen in broader perspective for further study.

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THE INTERNAL ENVIRONMENT AND BEHAVIOR.

PART V. INTERNAL SECRETIONS.*

By CURT P. RICHTER.†

The previous contributors to this symposium have emphasized the physiological factors which help to maintain a constant internal environment. I want to emphasize the behavior factors, or the responses of the total organism, which also contribute to this end. The examples that I will give are drawn from the field of internal secretions. We know, for instance, that the maintenance of a normal water balance depends largely on the secretion of anti-diuretic hormones from the posterior lobe of the pituitary gland; that a constant body temperature is maintained largely through the secretions from the anterior lobe of the pituitary; further, that the normal salt balance depends on the secretions from the cortex of the adrenals; and that the calcium balance depends on the secretions from the parathyroids. In the normal body the secretions from these various glands help to maintain the constancy of internal environment. After removal of any one of them we find that, if the animals remain in their same surroundings and have the same amount of food, water, salt, or calcium, their internal environment will be changed so much that they will develop deficiency symptoms or die in a short time. What do these animals, deprived of their physiological means of regulation, themselves do to maintain life and a constant internal environment?

The first example concerns the regulation of water balance. In the normal animal the secretions from the posterior lobe of the pituitary gland play an important part in the maintenance of water balance. Removal of this gland takes away the organism's most important internal means of regulating water metabolism. Without the anti-diuretic secretions the kidneys excrete urine unchecked;

*The following experiments were carried out in collaboration with Drs. L. Emmett Holt, Jr., Bruno Barelare, Jr., John F. Eckert, Edward C. H. Schmidt, Jr., and C. Douglas Hawkes.

†From the Psychobiological Laboratory, Johns Hopkins Hospital, Baltimore, Md.

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the organism quickly becomes dehydrated and dies. However, given free access to water, such animals will drink sufficiently large amounts to maintain their water balance and thus survive. This condition is known as diabetes insipidus. Fig. 1 shows a rat's hourly urine output for 12 hours after removal of the posterior

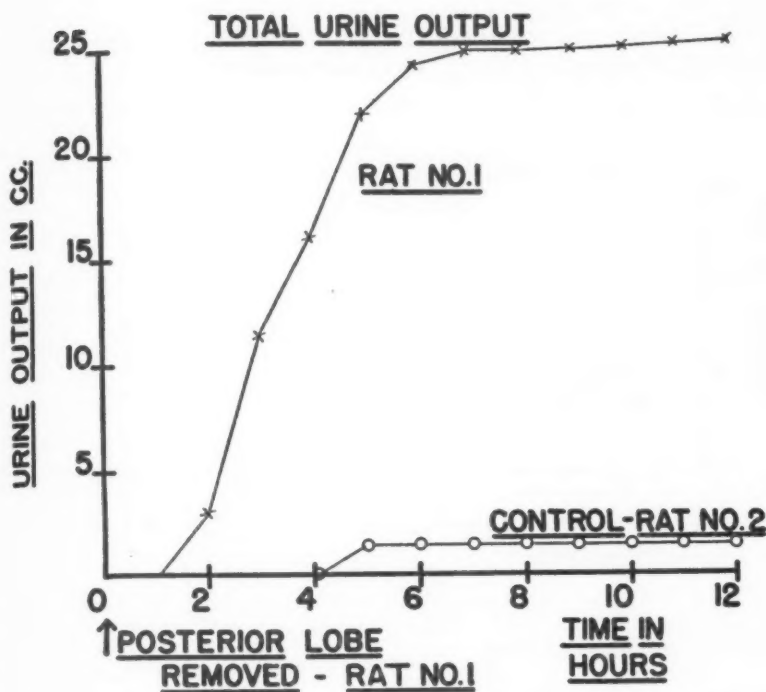


FIG. 1.—Graph showing the record of marked polyuria produced by removal of the posterior lobe of the pituitary gland in a rat deprived of all water, and the record of urine output of a normal control rat also deprived of all water.

lobe when not given free access to water. At the end of 6 hours this rat (No. 1) had lost 25 cc. or approximately $\frac{1}{4}$ of its body weight, and had become extremely dehydrated. During the same time a control rat (No. 2) lost only 2 cc. Fig. 2 shows the urine output and water intake of a rat given free access to water after removal of the posterior lobe. During the fourth hour after the operation, the rat began excreting urine in large amounts. Two

hours later, presumably when the internal water balance became affected, the animal began drinking water and thereafter increased its water intake in proportion to urine loss. Fig. 3 illustrates the water intake record of such an animal over a long period of time. Before removal of the posterior lobe, the daily intake averaged 20 cc.; afterwards it averaged 85 cc. Given free access to water, such rats maintain themselves indefinitely (Richter, 1936).

The next example concerns the regulation of body temperature. We know that in the intact animal the integrity of the mechanism which maintains body temperature at a constant level depends very

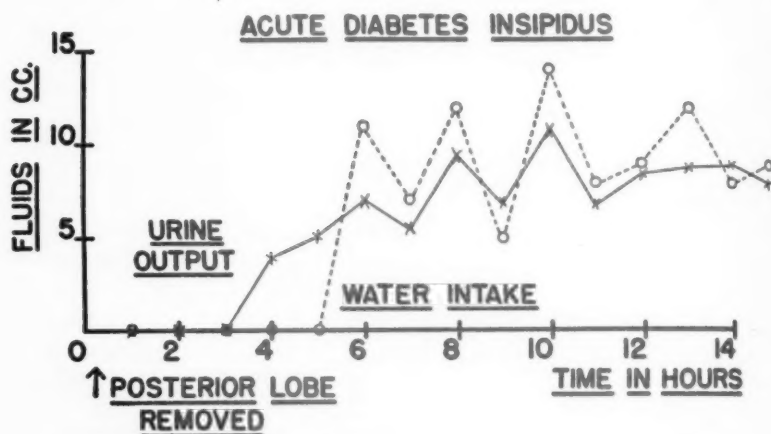


FIG. 2—Graph showing primacy of the polyuria over the polydipsia in a rat with acute experimental diabetes insipidus produced by removal of the posterior lobe of the pituitary gland.

largely on the secretions from the pituitary and thyroid glands. After removal of one or both of these glands, the metabolic rate is reduced, body temperature tends to fall, and if exposed to either cold or heat, the animal dies. Do such animals, which have lost their internal means of regulating body temperature, themselves make any effort to maintain a normal temperature? The following quantitative studies made on the nest building activity of rats give an answer to this question. Fig. 4 shows the type of cage used for these studies. Each cage was equipped with a roll of soft paper, $\frac{1}{2}$ inch wide and 500 ft. long, and a cyclometer which registered the amount of paper removed from the roll. The end of the strip of

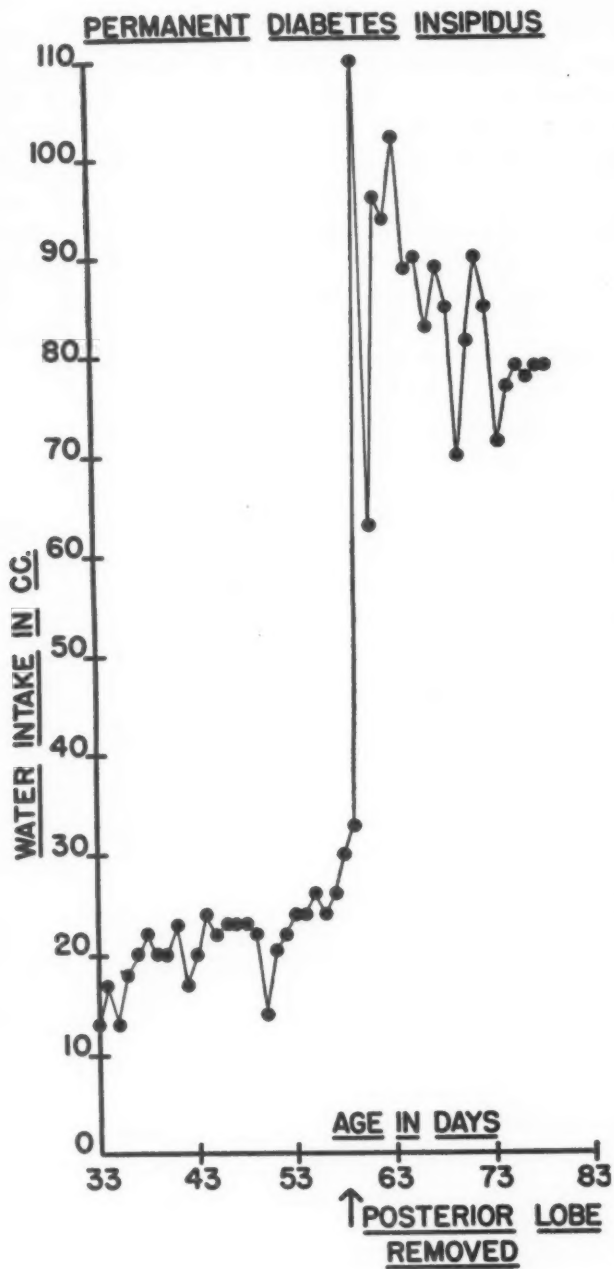


FIG. 3.—Graph showing permanent polydipsia produced in a rat by removal of the posterior lobe of the pituitary gland.

paper hung freely inside the cage within easy reach of the rat; and since the cages contained no sawdust or other material, the rats were obliged to use the paper for nest building. Each day all of the paper pulled off the roll into the cage was removed, and each day the rats built a new nest. Under normal circumstances the amount of paper used daily remained nearly constant and approximately the same for the two sexes. In cold external temperatures the rats built large nests; in warm external temperatures, small nests. With this method we found that, after removal of either the pituitary or the thyroid, the rats built much larger nests. The amount of paper used daily averaged 4 to 15 times higher than in the preoperative period. Fig. 5 shows a typical record of the effects produced by hypophysectomy on nest building, body temperature, and body weight. Coincident with the decrease in body temperature (100.3° to 94.6°) after hypophysectomy, the rat began using more paper. The amount used daily increased 4 to 5 times over the normal level. Sixty-five days after hypophysectomy all nest paper was permanently removed. Twenty-five days later body temperature decreased sharply (to 90.8°) and two days later the rat died. One hypophysectomized rat used the entire roll of 500 feet during one 24-hour period. It formed the paper into a large ball-shaped nest with a single entrance, and the entire nest could be picked up by simply hooking one finger in the entrance hole. Fig. 6 shows a typical record of the effects produced by thyroidectomy. This rat used about 10 times as much paper as it had before. Thus, in response to lowered heat production, the rats made an effort to conserve heat by reducing heat loss. Feeding large amounts of desiccated thyroid gland in the food caused the nest building activity to return to a low level again (Richter and Eckert, 1936.)

The next example concerns the regulation of salt metabolism. After bilateral removal of the adrenal glands, rats live only 10 to 20 days because of the excessive loss of salt in their urine. When salt is administered, either by injection or by feeding, at the same rate that it leaves the body in the urine, the rats can be kept alive. We were interested to know whether, if given free access to salt in a container separate from the food, adrenalectomized rats would maintain themselves and remain free from symptoms of insuffi-

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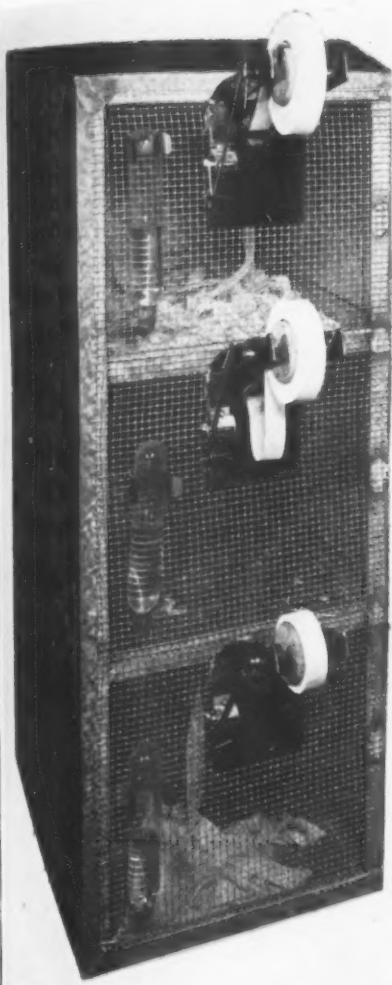


FIG. 4.—Photograph of 3 nest building cages, showing the $\frac{1}{2}$ inch rolls of soft paper, the glass tubes through which the strips of paper enter the cages, and the cyclometers which record the length of paper unrolled and pulled into the cage by the rats.

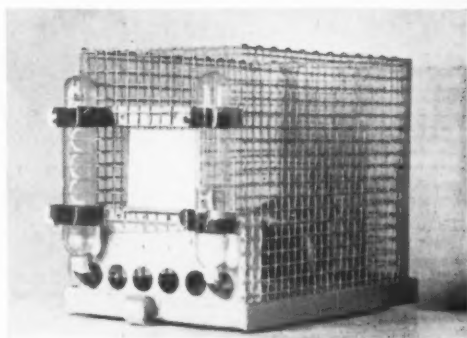


FIG. 7.—Photograph showing cages used for mineral choice experiments. Each cage contained a food cup and two graduated inverted bottles.

~~TEST BUILDING SKID PROTECTORS~~

Tool

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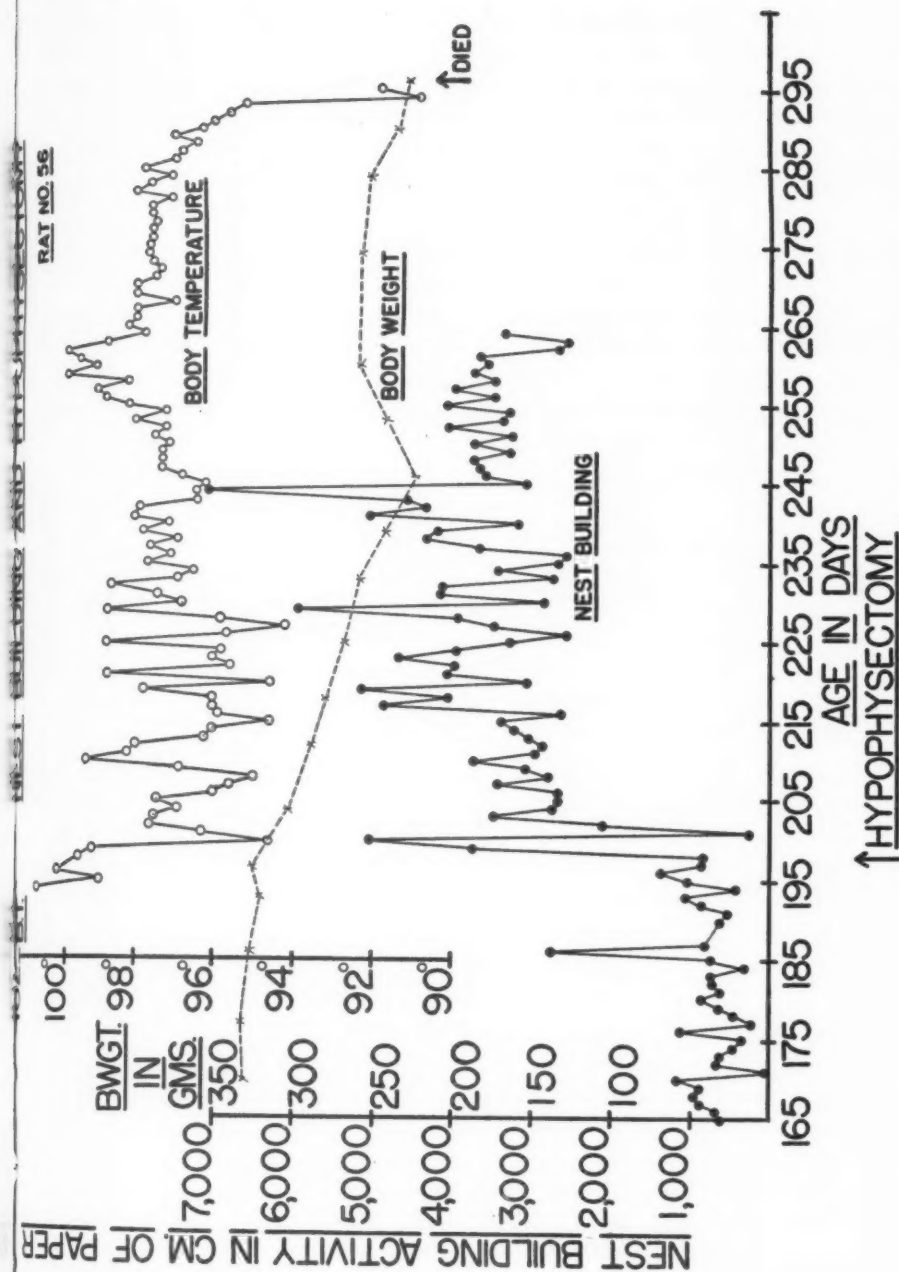


FIG. 5.—Typical record showing the decreased body temperature and the increased nest building activity produced by hypophysectomy.

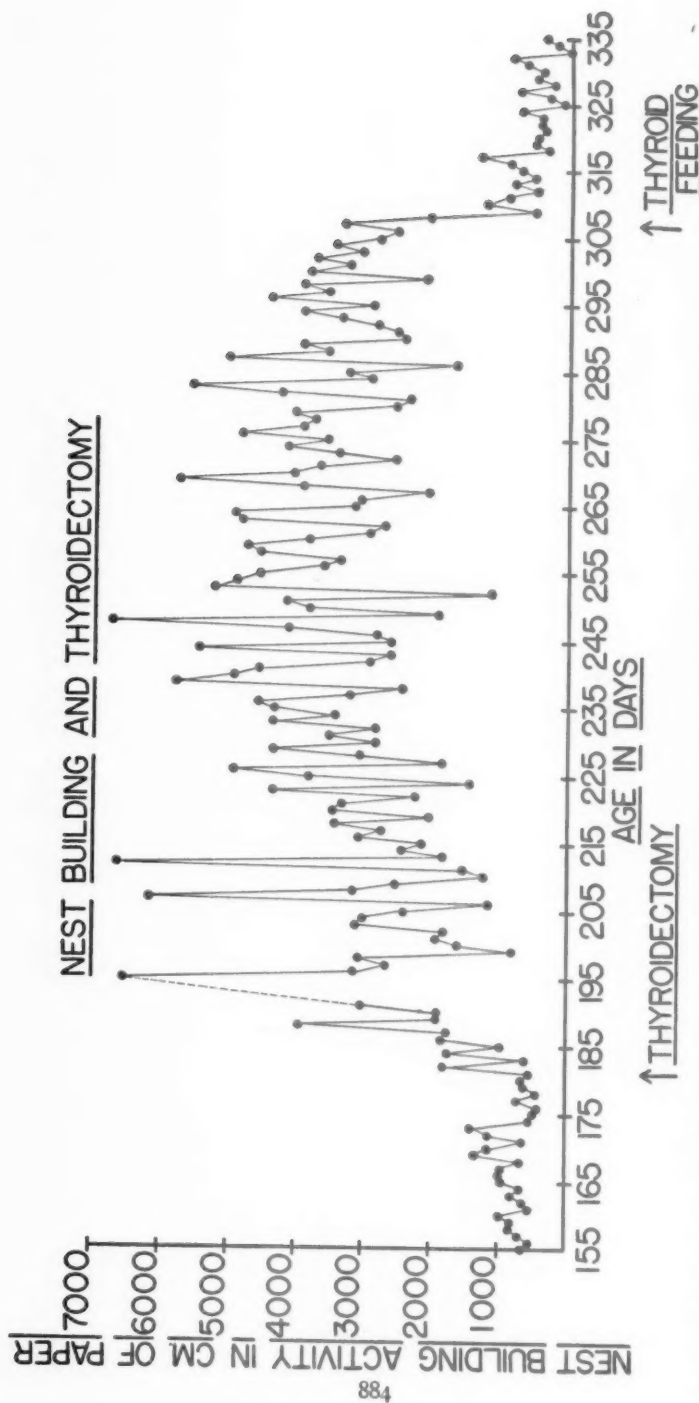


FIG. 6.—Typical record from a rat showing the increased nest building activity produced by thyroidectomy and the decreased nest building activity produced by feeding desiccated thyroid gland.

ciency. For this purpose we used cages of the type shown in Fig. 7. Each cage contained a food cup and two graduated inverted water bottles, one filled with tap water, the other with a 3 per cent solution of sodium chloride. After several weeks, when the intake of water and salt solution had reached constant levels, we removed the adrenals. Almost immediately after operation, in some instances on the same day, the rats began drinking large amounts of salt solution and after a month drank 15 to 20 times as much as before. They survived, gained weight, and remained free from symptoms of insufficiency. Fig. 8 shows two typical records—one of the water intake and the body weight of a rat that had no salt choice (this rat died 7 days after adrenalectomy), the other of a rat which had access to salt solution. At the end of 40 days this rat daily drank about 10 times as much salt solution as it had before operation. It continued to gain weight and gave all indications of living a normal span (Richter, 1936).

The next step was to determine which one of the two components of common salt, the chlorine or the sodium, the adrenalectomized rats needed. Given access to sodium salts, other than sodium chloride, *i. e.*, the lactate and phosphate, they ingested sufficiently large amounts to keep themselves alive; but given access to chlorides of other metals, such as magnesium chloride, aluminum chloride, or potassium chloride, they showed no increased appetite for them and died within 10 to 15 days. When given free access to a number of mineral solutions at one time; namely, sodium chloride, dibasic sodium phosphate, potassium chloride, calcium lactate, calcium chloride, and water, the rats selected only the sodium solutions, especially the sodium chloride. Thus, in agreement with the results of biochemical studies, rats indicated by their appetite that adrenalectomy results in a need for increased sodium rather than chlorine (Richter and Eckert, 1938).

Similar observations were made on the regulation of calcium metabolism by the parathyroids. After removal of the parathyroid glands, the internal means of regulating calcium metabolism ceases to function. The rats develop tetany and other symptoms of insufficiency; their blood calcium drops to a low level; their blood phosphorus increases; and about 50 per cent of the animals die within a few days. When small amounts of calcium compounds are placed in their food, these rats can be kept alive and free from

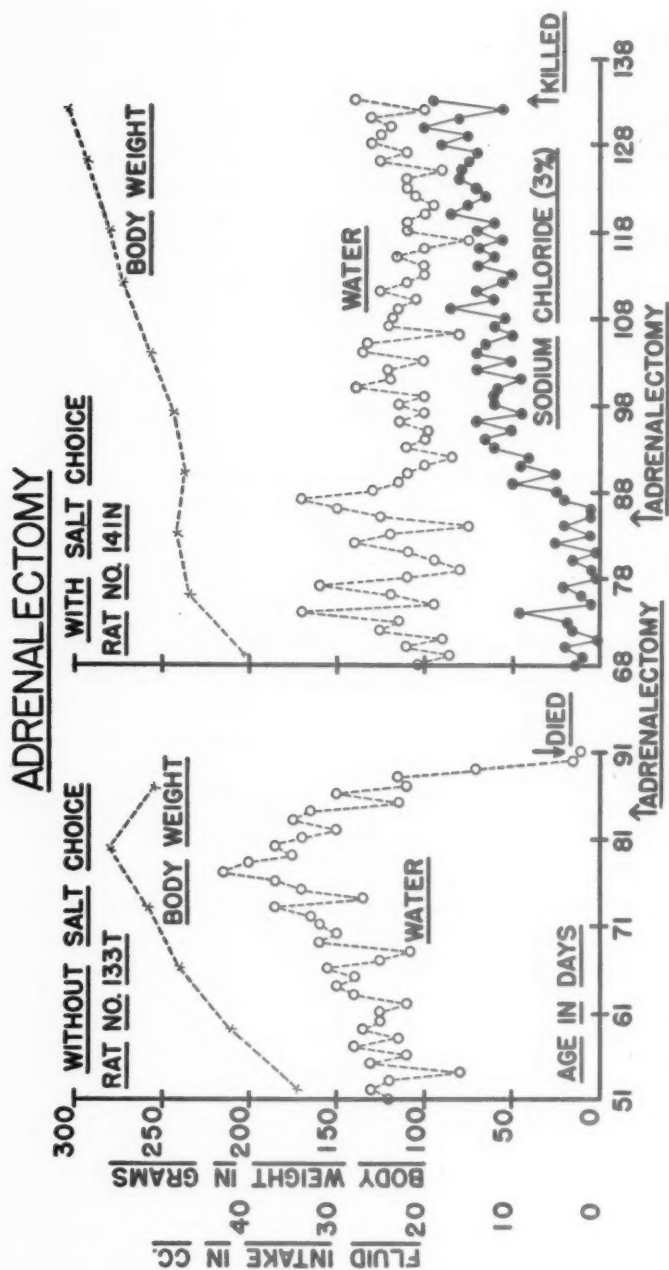


FIG. 8.—Typical records from 2 adrenalectomized rats, one of which had no access to salt and one which had access to a 3% salt solution. Their food contained no salt.

symptoms of insufficiency. When given access to calcium solutions, separate from their food, these rats show a greatly increased calcium appetite. Fig. 9 gives a record of such an animal. This rat had access to two drinking bottles, one filled with tap water, the other with a 2.4 per cent solution of calcium lactate. Immediately after parathyroidectomy it began drinking more of the calcium lactate solution. After 40 days the daily intake had in-

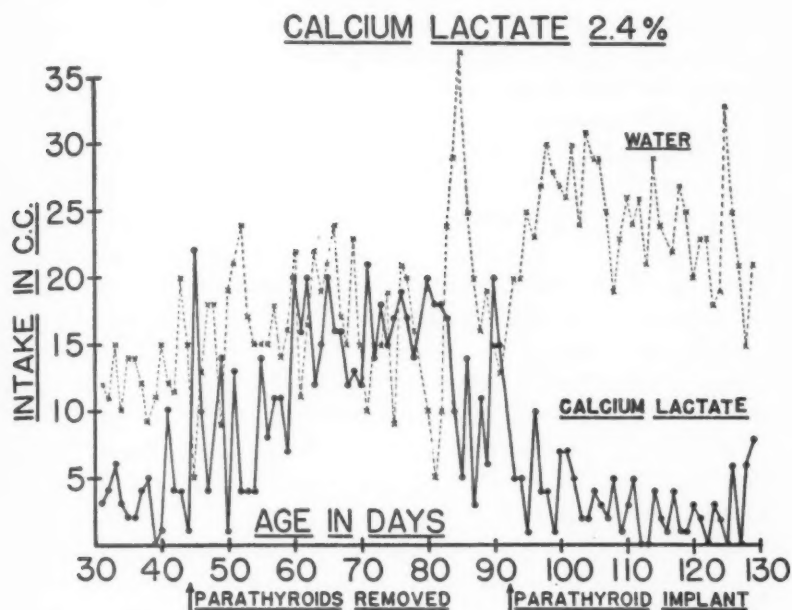


FIG. 9.—Typical record showing the increased appetite for calcium lactate produced in a rat by parathyroidectomy. The record also shows that parathyroid implants made to the anterior chamber of one eye caused the calcium lactate intake to decrease to its normal level.

creased 6-fold. Subsequently, parathyroid implants made to the anterior chamber of the eye reduced the intake to its normal level.

Here, again, we were interested to know whether the parathyroidectomized rats seek other calcium solutions besides the lactate, or any other minerals besides calcium. We found that they have a definitely increased appetite for calcium gluconate, calcium acetate, and calcium nitrate. They failed to show an increased appetite for lactates of other metals. The only elements, other

than calcium, for which the animals showed an increased appetite were strontium and magnesium, both of which chemically are closely related to calcium and both of which are known to have at least an ameliorative effect on parathyroid tetany. When given access to 6 to 8 mineral solutions in separate containers, the rats regularly showed the greatest increase in appetite for the calcium solutions, especially the lactate, and a decreased appetite for phosphorus solutions, which agrees with the observations that parathyroidectomy produces an increase of phosphorus in the blood, rather than a deficit (Richter and Eckert, 1939).

After finding that rats make such advantageous selections from these purified mineral solutions, it occurred to us that they might be able to select their entire diet from purified, or nearly purified, substances—that is, make selections which would maintain a constant internal environment. I shall not stop here to tell you how we worked out this problem. We have found that, when given access to at least one representative in purified, or nearly purified, form of each of the substances known to play an important part in nutrition, rats made selections which resulted in normal growth, development, and reproduction. These substances were offered in separate containers—olive oil for fat; sucrose for carbohydrate; casein (autoclaved and purified) for protein; 5 mineral solutions: sodium chloride, dibasic sodium phosphate, calcium lactate, potassium chloride, magnesium chloride; cod liver oil for vitamins A and D; dried baker's yeast for the vitamin B complex; and water. The intake of each substance was recorded daily. On such a self-selection diet the rats ate from 15 per cent to 40 per cent less food by weight than on the McCollum stock diet, which is one of the best of the empirical food mixtures. The daily intake on the self-selection diet averaged 8.9 gm., while on the McCollum diet it averaged 14.0 gm.

Of particular interest is the fact that, despite the much lower food intake, as measured in grams, the rats on the self-selection diet grew at the same rate as the rats on the McCollum diet and were equally active and reproduced normally. Rats kept as long as 600 days showed no signs of any abnormality. Clearly, they made advantageous selections (Richter, Holt, and Barelare, 1938).

It appeared from these results that in the case of the selection of the entire diet, just as after adrenalectomy and parathyroidec-

tomy, the rats made selections which kept them in good health. Further, by their selections they disclosed their internal needs.

We have applied this technique to the study of changes in appetite in a variety of conditions, such as pregnancy and lactation, vitamin A and B deficiencies, and pancreatectomy.

From biochemical studies it is known that pancreatectomy greatly alters both the fat and the carbohydrate metabolism. Pancreatectomized rats lose weight, have an increased blood sugar, drink large amounts of water, and excrete large amounts of urine. How do pancreatectomized rats fare on the self-selection diet in which they have access to the substances just mentioned? And which substances do they select?

With Dr. Edward Schmidt I found that on the self-selection diet such rats quickly lost their symptoms of deficiency and that they drank normal amounts of water, gained weight, and no longer showed the marked hyperglycemia. They refused the carbohydrate, sucrose, but ate large amounts of the fat, olive oil, and fair amounts of yeast and of the protein, casein. Fig. 10 gives the water intake and body weight records of a rat that was pancreatectomized at 29 days and placed in the self-selection cages at 98 days. On the McCollum diet its daily water intake had averaged 80 cc. On the self-selection diet the intake dropped to 28 cc., body weight increased, hyperglycemia was reduced. Returned to the McCollum diet, the animal immediately began drinking large amounts of water again and lost weight. On the self-selection diet this rat ate no sucrose, but took large amounts of olive oil, casein, and yeast. Thus, these pancreatectomized rats, as did the animals without adrenals or parathyroids, made a definite and successful effort to maintain a normal internal metabolism.

It may be asked, "Do these rats with the various glandular deficiencies make these selections because of experience, that is, do they eat certain substances because of the effects which result from their ingestion, such as relief from discomfort; or are their selections made because of changes in their taste for these substances, that is, are the rats attracted to the foods chemotropically, as lower organisms are attracted to various chemicals?" The evidence at hand favors the latter view. We have found, for instance, that adrenalectomized rats have a greatly lowered taste threshold for salt. They distinguish between distilled water and salt solu-

tion in concentrations of 1 part of salt to 33,000 parts of water, while normal rats make this distinction only in 1 part of salt to 2,000 parts of water. The small amount of salt obtained daily in the 1 : 33,000 solution probably did not have any physiological effect. (Richter, 1939.)

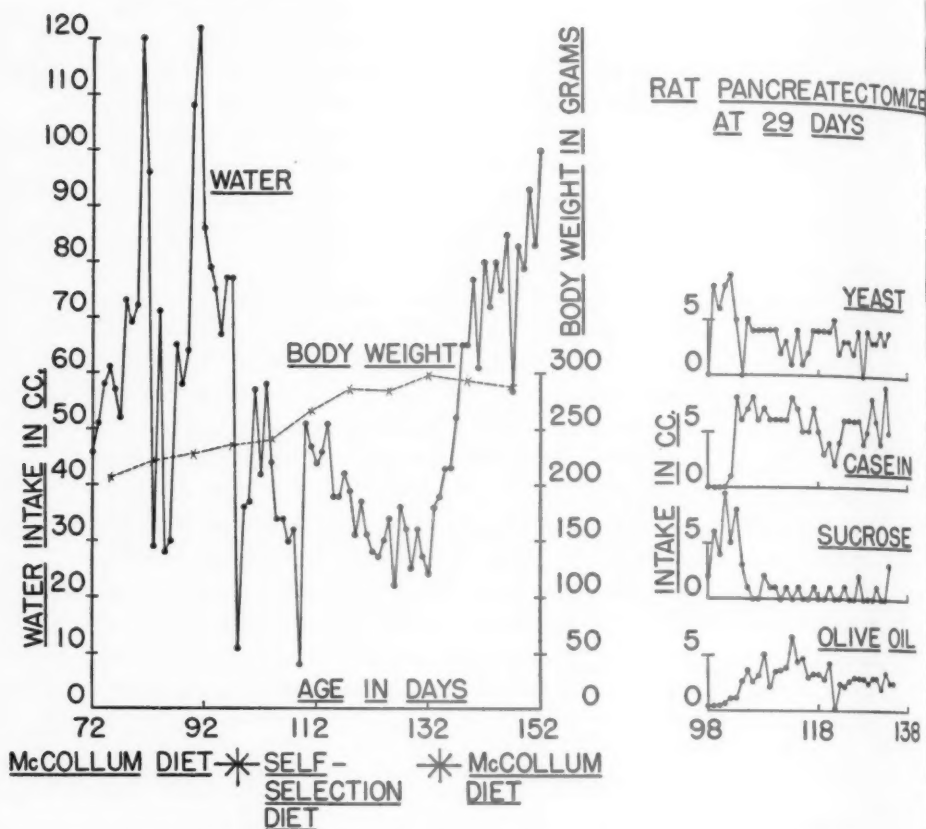


FIG. 10.—Typical record showing disappearance of diabetic symptoms of a pancreatectomized rat while on the self-selection diet. The record also shows a rat's fat, carbohydrate, protein, and yeast intake while on the self-selection diet. In this record water intake does not include the water from the mineral solutions.

We have obtained similar evidence from studies of the effects produced on the rat's selective ability by section of the taste nerves. We wanted to know, for instance, whether, after section of the taste nerves, adrenalectomized rats still recognize salt, ingest large amounts of it, and as a result keep themselves alive.

In collaboration with Dr. C. Douglas Hawkes it was found that, after section of all of the taste nerves to the tongue, adrenalectomized rats no longer increased their salt intake and, consequently, died within a short time. Fig. 11 gives the record of the salt intake of a normal rat and of an animal in which the lingual nerves and

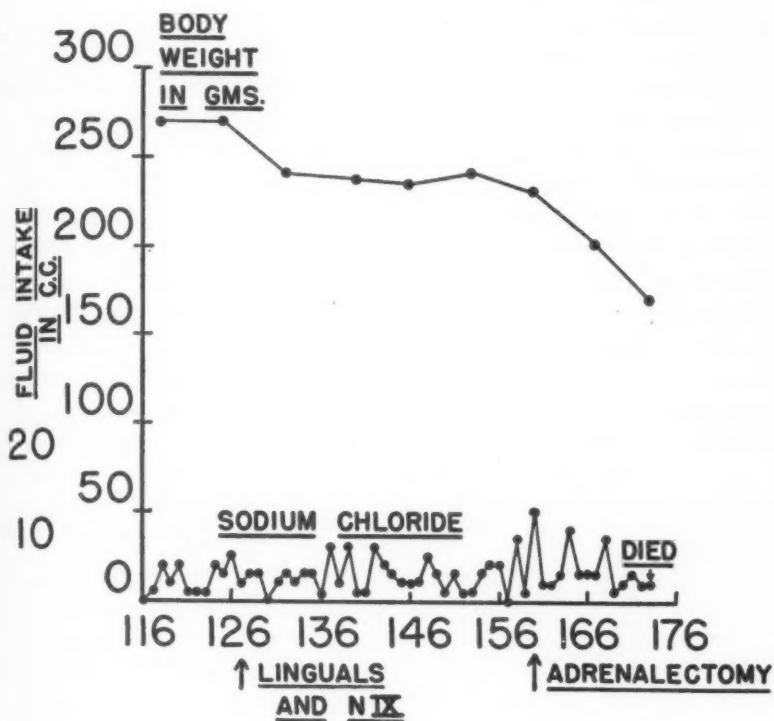


FIG. 11.—Record showing the failure of an adrenalectomized rat to increase its salt intake and to survive after section of the lingual and glossopharyngeal nerves.

the glossopharyngeal nerves had been cut. The operative animal lost weight, failed to increase its salt solution intake, and died in 12 days. We have found also that after section of the taste nerves the rats do not differentiate between distilled water and various mineral solutions until very high concentrations are reached, apparently not until the intake of the solutions had some systemic effect.

Thus, it would appear that after adrenalectomy the salt deficit throughout the body, and particularly in the taste buds of the tongue, alters the chemistry of the taste buds in such a way as to make salt taste more attractive.

Thus far I have confined my examples entirely to rats. We are working on other animals—guinea pigs, ferrets, squirrels, monkeys—and also on humans. We have already gathered a considerable number of instances of self-regulatory behavior in humans with various glandular deficiencies, most notably in patients suffering from Addison's disease and other diseases which involve the destruction of the adrenal cortex. Such individuals often manifest a great craving for salt. We have one instance of a 3-year old boy who ate enormous amounts of salt daily. He ate salt literally by the handful, the way other children eat sugar. Brought to a hospital and unwittingly restricted to the normal diet containing the usual amount of salt, he died in 7 days. Autopsy studies showed that a tumorous growth in his adrenals had completely obliterated all cortical tissue. Like the adrenalectomized rats, he had at home kept himself alive for over 2 years by eating large amounts of salt (Wilkins and Richter, 1940).

In summary, we have demonstrated experimentally that the maintenance of a constant internal environment depends not only on physiological factors, but also on behavior factors, responses of the total organism. Definite proof of the existence of the behavior factors was obtained in experiments in which the physiological factors had been excluded. We saw that rats threatened with dehydration due to the loss of the anti-diuretic hormone from the posterior lobe of the hypophysis maintained a normal internal water balance by drinking large amounts of water; further, that rats threatened with a seriously lowered body temperature following hypophysectomy or thyroidectomy built large nests and thereby conserved their body heat; that rats whose internal salt balance had been disturbed by adrenalectomy drank large amounts of salt solution and thereby kept themselves alive and free from symptoms of insufficiency; that parathyroidectomized rats sought calcium solutions and thus maintained their normal calcium balance; and finally, that pancreatectomized rats, which apparently are unable to utilize carbohydrates, avoided sucrose and ate large amounts of the fat, olive oil, thus freeing themselves from symptoms of diabetes.

In the normal organism the physiological and behavior factors must function side by side, but exactly how we do not know. Undoubtedly much of our behavior is concerned with the maintenance of a constant internal environment. Further research along these lines must concern itself with situations in which this effort to maintain a constant internal environment fails or breaks down. With dietary selections we know already that some individuals make harmful selections because of defective gustatory sensory equipment, which may entirely prevent them from tasting certain substances. We have found a fair number of individuals who are unable to recognize even common sugar, except in high concentrations. Central nervous system disturbances will also have to be investigated.

Thus, from these and other similar observations we have concluded that the effort to maintain a constant internal environment constitutes one of the basic drives of human and animal behavior.

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PARADOXICAL VESTIBULAR REACTIONS IN SCHIZOPHRENIA UNDER THE INFLUENCE OF ALCOHOL, OF HYPERPNEA AND CO₂ INHALATION.*

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In a previous investigation the vestibular reactivity of schizophrenics and normal persons to caloric and rotatory stimulation has been studied.¹ It was found that the nystagmic reaction in the schizophrenic group is greatly diminished and more so in response to caloric stimulation than in response to rotation. It was also found that the patients with the lowest vestibular reactivity had certain clinical characteristics in common.

Further pursuance of this line of investigation seemed to us particularly indicated because of the rather sharp differentiation between schizophrenic and normal individuals with regard to their vestibular reactions. The origin of this difference is at present entirely obscure and more information is needed before a reasonable explanation may be offered.

We thought that in order to obtain more information it might be profitable to compare the nystagmic reaction in schizophrenic and in normal individuals under the influence of such drugs as are known to affect in various ways the functions of the central nervous system. After a preliminary exploration with sodium amytal, cocaine, benzedrine sulphate, caffeine, alcohol and increased and diminished CO₂ tensions, the last three were selected as the ones which promised to be most informative.

TECHNIQUE.

In the experiments with alcohol 36 schizophrenics and 20 normal persons and in the experiments with CO₂ inhalation and hy-

* Read at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

From the Research Service of the Worcester State Hospital, Worcester, Mass.

perpnea 33 patients and 23 normal persons served as subjects. Cases with defective ear drums, with histories of middle-ear infections and similar ailments were excluded. The hospital age of the patients ranged between 2 months and 23 years, with a mean of 6.9 years. Since we were particularly interested in those patients whose nystagmic reactions were extremely reduced, we included more of these subjects in our group than are seen in an unselected group of schizophrenic patients.

The caloric stimulation was given in the following way. The patient was placed in a sitting position and his head was tilted forward at a thirty-degree angle. Twenty cc. water at 20° temperature was injected over a 10-second period into the right ear. The ear was then dried and 60 seconds after the injection of water the subject's head was quickly tilted backward at about 90° and the number of nystagmic beats were recorded with a key and signal magnet on a kymograph. To facilitate the reading of nystagmus the subject was fitted with a pair of lenses of 20+ diopter fixed in ordinary goggles.

EXPERIMENTS WITH ALCOHOL.

In these experiments, 2 control readings of nystagmus to caloric stimulation were first obtained, after which 30 cc. of 95 per cent alcohol, flavored with orange-peel syrup and diluted with 180 cc. of water, was administered orally on an empty stomach. Caloric stimulation was then given and readings of nystagmus were taken at intervals of 15, 30 and 60 minutes after the administration of alcohol. After a few days the experiments were repeated on each subject. The results are given in Fig. 1.

Fifteen minutes after the administration of alcohol the total number of nystagmic beats in the patients shows a sharp rise from the control level of 39.9 beats to a level of 62.3 beats. At the same time the normal controls dropped from a much higher control level of 69.0 beats to a level of 54.0 beats. In the next 45-minute period the patients dropped slowly from the maximum of 62.3 beats to 47.8 beats, not, however, reaching the original control level even in an hour after the administration of alcohol. In the normal controls, on the contrary, the number of nystagmic beats increased during the same period, having reached an even higher level than the original control reading.

If, instead of the absolute number, the average frequencies (number of nystagmic beats divided by the total duration of the response) are plotted, the curves thus obtained are very similar to those representing the absolute numbers. The average frequency of the patients rises from a control level of .61 to .82, fifteen minutes after the administration of alcohol, and drops to .80 and to .69 at the end of 30 and 60 minutes respectively. The normal controls dropped from the control level of .95 to .79 after 15 minutes, and rose again to .92 and .95 after 30 and 60 minutes respectively.

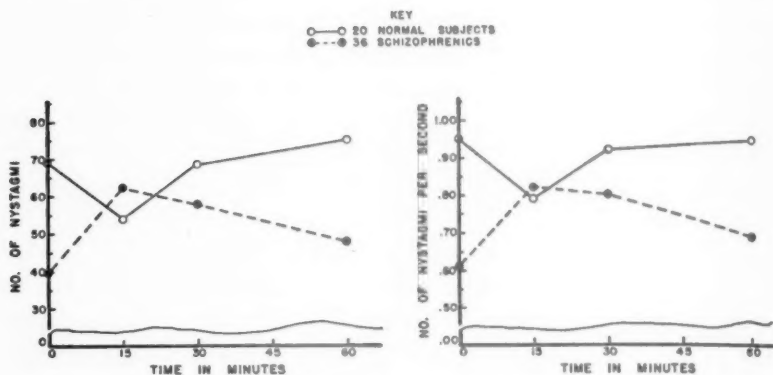


FIG. 1.—Vestibular Reactivity Under Alcohol.

It was thought possible that the different reaction of patients and normals to alcohol may be related to the difference of the control levels. However, the correlation between the control level and rise in the patients (.11) and the correlation between the control level and the drop in the normals (.30) is negligible.

The curve of the individual patients and normal controls follows the general pattern of the respective groups, although the characteristic increases and drops are much more pronounced in some cases than in the curve representing the changes in the group mean, while in other cases they are very slight.

The most outstanding feature of the results is that the curve of the patients and that of the normals is almost perfectly symmetrical and opposite: for every rise in the patients there is a corresponding drop in the normals and vice versa. In other words,

the patients show a paradoxical nystagmic reaction under the influence of alcohol.

EXPERIMENTS WITH CO₂.

After two control readings were obtained, the subject was requested to breathe a 5 per cent CO₂-air mixture from a rubber bag for a period of 4 minutes. Towards the end of this period marked hyperpnea was observed. The amount of inhaled CO₂

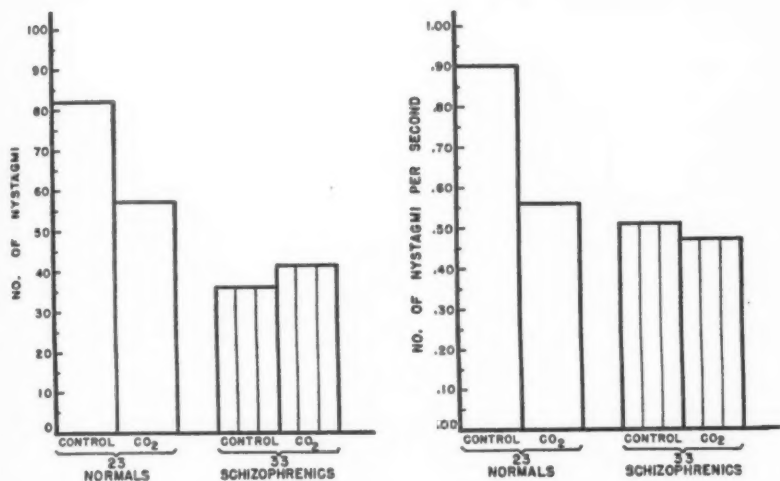


FIG. 2.—Vestibular Reactivity Under CO₂.

may have been somewhat different in the various individuals due to the increase of concentration in the bag through the expired CO₂. This arrangement was rather crude, but it was satisfactory in bringing out the gross qualitative differences with which we are primarily concerned. Cold water was injected in the ear 30 seconds before the discontinuance of the CO₂ inhalation. On each subject a minimum of two tests was performed.

The results of these experiments are given in Fig. 2. The mean nystagmic number and frequency of the normal control group drops very significantly; the absolute number drops from 81.8 to 57.3 beats and the average frequencies from .91 to .56. This is in agreement with Gellhorn and Spiesman's² finding in a similar

experiment. The individual subjects all showed a greater or lesser drop, with the exception of one subject who showed a slight rise.

The patients as a group rise from a control level of 36.4 to 41.6 nystagmic beats, which is slight but statistically significant. The change in frequency (control: .51; under CO_2 : .47) was statistically not significant.

The patient group, however, is quite heterogeneous in its reaction to CO_2 ; some showed an increase, some remained the same and a few behaved similarly to the normals, that is, they showed a drop. The results of these three groups are represented in Fig. 3.

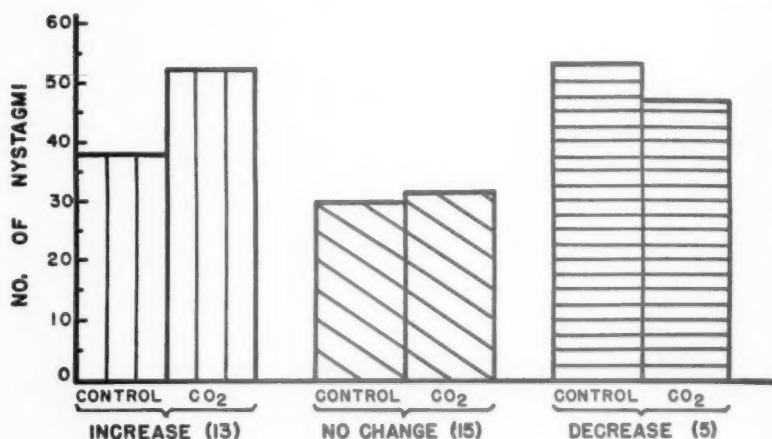


FIG. 3.—Types of Vestibular Reactivity Under CO_2 in 33 Schizophrenics.

Consideration of the number of nystagmus shows 13 of the 33 patients (about 40 per cent) as having a paradoxical reaction; that is, an increase instead of the decrease which should be normally the case. Fifteen further patients (about 45 per cent) did not show any change in either direction, and thus still differ significantly from the normals, whose nystagmic reactions was found to be depressed under the influence of an excess of CO_2 . Only 5 patients (about 15 per cent) behaved similarly to the normals. The frequency does not show much change except in the third group in which it drops parallel with the number.

There is no significant correlation between the control level and response to CO_2 in either normals or patients.

EXPERIMENTS WITH HYPERPNEA.

The subjects were requested to breathe deeply and rapidly for about 2 minutes. For some of the normal subjects the time had to be somewhat shortened because of the excessive dizziness, numbness and other disagreeable subjective symptoms which they experienced. The injection of cold water took place about 30 seconds before the end of the hyperpnea. Also in this series at least two control readings and two readings under the influence of hyperpnea were obtained. The results are given in Fig. 4.

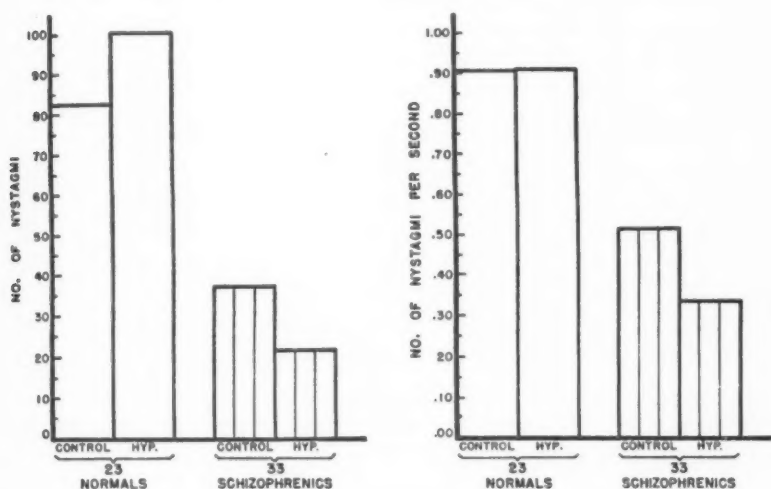


FIG. 4.—Vestibular Reactivity Under Hyperpnea.

In the group of normal subjects the total nystagmic number increases from a control level of 82.5 beats to 100.2 beats. Under the influence of hyperpnea the frequency remains practically unchanged. These results confirm Gellhorn and Spiesman's previous findings. It may be worthwhile to mention, however, that two of the normals showed a slight drop under the influence of hyperpnea, behaving thus somewhat similarly to the patients.

The bars representing the means of the patient group show a symmetrically opposite picture, particularly with regard to nystagmic number. The number of nystagmic beats drops from a control level of 37.1 to 21.6 beats, and the frequency from .52 to .33.

With the exception of a few patients who have extremely low control levels (1 to 6 beats) and who, of course, cannot drop very significantly, all individual patients showed a diminution. The correlation between control level and amount of drop is very high (.091). This means that the drops when expressed as per cents of the control levels are very similar for all patients.

DISCUSSION.

Particular significance attaches to these figures from the fact that under the circumstances specified the nystagmic reaction of schizophrenics is not only quantitatively different from the normals but under the influence of experimental factors shows an opposite direction.

The reason for the paradoxical reaction of schizophrenics is at present a matter of conjecture and we are not able to offer a satisfactory explanation. It may be possible that the stimuli which have been applied in the present study do not reach the brain of the schizophrenic in the form that they reach the brain of the normals.

In attempting to explain the results of the experiments with alcohol one may consider differences in the rate of absorption. The reports available in the literature on the rate of absorption of alcohol in schizophrenics do not seem to support such an hypothesis.

The vestibular reaction of schizophrenics to increased and decreased CO_2 tensions might make one suspect some abnormality in the regulation of acid-base equilibrium in the schizophrenics.

It seems to us more likely that some sort of disturbed integration between the cortical and sub-cortical functions in schizophrenia may be the explanation of the strange reactions of the patients.

Alcohol and CO_2 both depress the cortical and sub-cortical functions in normal persons. The increased reaction in schizophrenia may be due to the removal of cortical inhibition. This would presuppose that the cortex in schizophrenia becomes much more depressed under the influence of the above-mentioned stimuli than does the normal cortex. The depressive effect of hyperpnea on the nystagmic reaction of patients, however, could not be explained on the same basis.

These suggestions are entirely tentative and have to be empirically tested along with other possibilities before a sufficient basis for a sound theory can be evolved. We are aware of the fact that our data need further confirmation and that this line of investigation needs to be extended in several respects. At present our main purpose is to survey the field rapidly in order to detect the main clues for planning more exacting investigations with the aid of improved technics.

SUMMARY.

1. The nystagmic reaction to caloric stimulation under the influence of alcohol, increased CO_2 tension and decreased CO_2 tension has been studied in schizophrenic and normal persons.

2. Under these experimental conditions, the schizophrenic patients showed an apparently paradoxical reaction.

a. Under the influence of alcohol the normals showed an increase, the patients a decrease in the number and frequency of nystagmus.

b. CO_2 depresses the nystagmic reaction in normals. In 40 per cent of the patients, CO_2 causes an increased reaction; 45 per cent show no change and 15 per cent behave somewhat similarly to the normals.

c. Hyperpnea causes an increase in the normals and a decrease in the patients.

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2. Gellhorn, E., and Spiesman, I.: The influence of hyperpnea and of variations in the O_2 and CO_2 tension in the inspired air upon nystagmus. *Am. J. Physiol.*, 112: 662-668, 1935.

DISCUSSION.

DR. PAUL SCHILDER (New York, N. Y.).—This is a very welcome contribution to the organic part of the psycho-physiology of schizophrenia. There have been many indications that the vestibular apparatus is involved in the schizophrenic symptomatology. In some schizophrenic pictures, we find a symptomatology similar to lesions of the central part of the vestibular apparatus and the symptomatology of the intraparietal syndrome, namely, distortions in the visual sphere, changes in the body image, micropsia and

macropsia. Dr. Angyal's experiments offer conclusive evidence that there is an organic change in the vestibular function in schizophrenics. It is, however, impossible to determine which parts of the vestibular apparatus are responsible for this change in function.

It might perhaps be worth while to make experiments of this type concerning past-pointing or deviation of the arms, which are dependent on the vestibular apparatus. I myself find almost regularly severe changes in the postural reactions and in past-pointing in schizophrenics. There is one symptom which is rather characteristic. Many schizophrenics can be induced very easily to turn around their longitudinal axis. Normals resist such a senseless procedure.

As to the localization of the changes which Dr. Angyal has described, I can offer no suggestion. Our knowledge of the vestibular apparatus is not sufficient at the present time to give such suggestions. We need more careful clinical examinations of cases with gross pathological lesions in the vestibular centers, especially in the cortical centers of the vestibular apparatus. Until we have such investigations, we must be content with having these interesting findings which are, as far as I can see, an important progress concerning the organic symptomatology of schizophrenia.

DR. ADOLF MEYER (Baltimore, Md.).—In view of the discussions that will come, I should like to mention some considerations with regard to this point. We have here an excellent presentation of the possibility of study of a particular function. The question then arises: How are these alterations of functions to be understood? Are they the components from the synthetic end, or are they components that impress one as being the victim of the total situation that arises in the process of schizophrenia? We have there an excellent example of the necessity of science's adapting itself to its material and recognizing that some of the things are to be understood as the effects of disturbances of the total function and of what then becomes of the individual participation of the various structures and organs, or we can see whether there is an element that shows in a particularly illuminating way how elemental structures can be attacked in disease. If it is essentially part of the total reaction, which I suspect it is to a very large extent, these experiments may show some leads as to how that total affection involves specific components. If, on the other hand, we can find specific factors that work in the vestibular apparatus in a particular way, we shall have made a beginning in the direction of understanding and perhaps influencing the processes, irrespective of that very large frame which we as a rule consider essential in the understanding and interpretation of this condition. We want to have freedom to attack the structures—from the elemental to the compound, and we want to see how a special function as it presents itself to us can also be studied from the totalistic end, you might say. It is only by experimentation and by concrete work that we shall furnish the material for the investigation of both of those issues.

DR. A. ANGYAL (Worcester, Mass.).—Dr. Schilder suggested to study the past pointing and deviation of the arm. That is one thing which we have to do. We intend to study the swaying which involves a different pathway as a nystagmic reaction *i. e.* vestibulo-spinal tract. We have to extend these studies in many other respects.

Dr. Meyer's suggestion to consider how this partial disturbance fits into the total reaction of the patient is most important. There are no isolated items in the individual, in the organism; everything hangs together with everything else and we have to interpret the single data in the frame of reference of the total reaction.

A TECHNIQUE FOR THE MODIFICATION OF METRAZOL THERAPY PROCEDURE.

By DONALD W. HASTINGS, M. D.,

AND

THURSTON D. RIVERS, M. D.,

Philadelphia, Pa.

In an attempt to reduce the severity of the metrazol convulsion in the treatment of psychoses, sodium iso-amyl ethyl barbiturate (Lilly) was employed. Injected prior to, or simultaneously with the metrazol, the sodium iso-amyl ethyl barbiturate (Lilly) produced a "missed" convulsion. These missed convulsions were in our experience of no therapeutic value; in fact, in the large majority of cases they seemed markedly detrimental. By delaying the injection of the sodium iso-amyl ethyl barbiturate (Lilly) until immediately after the injection of the metrazol, the character of the metrazol convulsion was in no way altered. However, the patients escaped the usual post convulsive anxiety, excitement and furor by sleeping quietly for about one half hour. This procedure lessened the apprehension of the patient for subsequent treatment, reduced the post convulsive nausea and headache and facilitated the nursing problem.

The advantages of this procedure have led us to adopt the following routine in giving metrazol at the Pennsylvania Hospital, Department for Nervous and Mental Diseases.

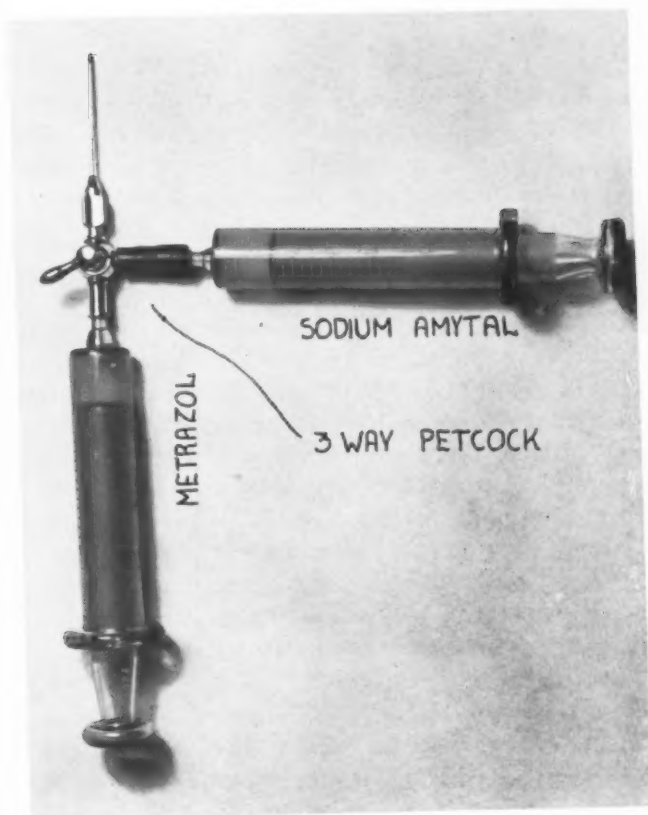
1. A three way petcock (see illustration) adapted to two syringes and a 19 gauge needle are used. The dose of metrazol is placed in one syringe and sodium iso-amyl ethyl barbiturate (Lilly) grains III in 2.5 c.c. of water is placed in the second syringe.

2. Metrazol in adequate convulsant dosage is injected in the usual manner. The valve is then turned immediately and the solution of sodium iso-amyl ethyl barbiturate (Lilly) given at a moderate of speed. This can easily be done and the needle removed from the vein before the convulsion takes place.

This procedure has been employed in over two hundred convulsions and no untoward effects have been noted.

To obviate the necessity for two venipunctures, the same apparatus has been used and is suggested for the curare and metrazol method of Bennett.¹

¹ Bennett, A. E.: Preventing traumatic complications in convulsive shock therapy by curare. *J. A. M. A.*, 114: 322-324, June 27, 1940.



Assembly of Syringes and Petcock.

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A DYNAMIC APPROACH TO THE STUDY OF REPLACEMENT THERAPY IN CASES OF CASTRATION.*

By GEORGE E. DANIELS, M. D., AND EDWARD S. TAUBER, M. D.,
New York City.

That the psychiatrist and psychoanalyst are convinced of the importance of sexuality, in personality development and in neurotic disturbances, can be taken for granted. Whatever the particular school of thought, and although there is considerable variation in the stress given to this factor as etiological, a neglect of the practical management of sexual disturbances appearing in the clinical picture would be evidence of ignorance or inaptitude. Within psychoanalytic circles we find a reaction, however, against the too-literal acceptance of the libido theory and the theory of instincts, amounting practically to a repudiation in certain instances. This has healthy aspects insofar as it promotes a more careful study and evaluation of other contributing factors, and is a trend away from the dangers of mystical or philosophical formulations which have the attractions and dangers of a mirage. On the other hand, human resistances to the concept of infantile sexuality, and to a sexual etiology of the neuroses, are deep-founded and have led periodically to schisms in the analytic camp. Furthermore, although it is healthy to clear away worn out theories and concepts, it is important not to throw out the baby with the bath water, and thus fail to continue in an orderly fashion the material growth of our knowledge on the subject of sexuality in health and disease.

What can we learn from a direct approach to the study of sexuality? If we continue to talk of the rôle of sexuality and instinct in psychiatry and psychoanalysis, it seems not only logical, but

* Read at the ninety-sixth annual meeting of The American Psychiatric Association, joint session with the section on psychoanalysis and the American Psychoanalytic Association, Cincinnati, Ohio, May 20-24, 1940.

This study was made possible by a grant of the National Committee on Maternal Health through funds from the Sex Biology gift to Columbia University.

From the Departments of Psychiatry and Medicine, Columbia University, New York, New York.

imperative, to examine the known facts contributed by other disciplines. Psychological investigation alone can reach a certain point, beyond which it merges with natural and physical sciences. It can help to point the way of investigation to workers in these other fields, as they in turn can stimulate and help to clarify concepts which analysts have arrived at empirically. Because of the taboos connected with the subject, the general body of facts has lagged far behind. Psychoanalysis, on the other hand, has pushed well beyond the frontiers. For this very reason, if it does not take pause, there is danger of its losing contact and becoming less effective.

Experimental medicine has added tremendous impetus to all the clinical branches. We see one of the most striking examples of this in the field of endocrinology. Here experimental biology has led the way, and biological tests and assays still hold the field. The work carried on by the experimental biologist affords valuable source material to the medical psychologist, and also points the way to an experimental approach to the problems of human sexuality.

We have been fortunate, at the Columbia Presbyterian Medical Center, to have the close collaboration of workers in the departments of medicine, psychiatry, gynecology, urology and anatomy in the initiation and pursuit of some of these studies, one of which we wish to present in this communication.

In casting about for suitable material for this investigation, human castrates were selected, because they presented an essentially experimental situation, the excision of a specific glandular system for therapeutic purposes.¹ We hear a great deal about castration fears and anxieties. What do we know about the effect of castration itself? Another manœuvre, after the extirpation of an organ, is to study the experimental effect of replacement of one of its initial ingredients. Record strides in the development of synthetic endocrine products have made the replacement of initial hormonal elements practical. Again, an experimental approach to replacement carries with it the therapeutic justification necessary to insure full cooperation of the subject in tedious routine. In

¹ The suggestion came from Dr. Earl T. Engle, professor of anatomy, Columbia University, who has given invaluable assistance throughout the study.

addition to light on the phenomenon of castration and the mechanism of sexuality to be obtained through replacement studies, we are in imperative need of careful examination of case material on replacement therapy, leading to a better understanding of the clinical course and of the indications and contraindications therefor. The present availability of synthetic hormonal products, artificially stimulated by commercial concerns, is leading to much uncritical and often harmful clinical application. The psychiatrist not infrequently sees cases of psychic impotence which have been treated by testosterone derivatives with no attempt to evaluate the emotional conflicts which are the real cause of the disorder. In many cases there is little or no result. In other cases the added pressure from regular injections of the hormone leads to accentuation of the neurosis. There may even be a resulting degeneration of testicular substance. A period which is being especially exploited is the so-called male climacteric which needs much careful study. It was felt that studies of replacement therapy in cases of castration might prepare the way for later investigation of replacement therapy in other conditions.

Before embarking upon the various problems presented in this paper, a review of the literature dealing with the effects of castration upon the sexuality of the male was undertaken by one of us, and is published elsewhere.² Possibly the most significant revelation in such a search is the discovery that a very broad variability in sexual behavior is observed after the testes are removed. Although libido and potency may be reduced for a shorter or longer time following castration, it is not uncommon for sexual behavior to remain unchanged. Some authors even have commented upon the heightened sexual desire. It is apparent that no single element could explain all the results but that a complicated set of integrated variables play their rôle in the total picture.

It is evident that the patient's personality, with pre-existing tendency to neurosis, is signal in determining the effect of the castration on the personality, and has a definite bearing on the individual responses to replacement. The whole effect of the castration on the ego structure as a corollary of this must constantly be borne in mind. The environmental milieu and its fluctuations is

² Edward S. Tauber: Effect of castration upon the sexuality of the adult male. *Psychosomatic Medicine*, Vol. 2, No. 1, pp. 74-87, 1940.

another aspect to follow, particularly, personality of the partner and his, or her, reaction to treatment of the subject. The rôle of suggestion has to be remembered, but to be intelligently understood it has to be followed in connection with the patient-physician relationship. To make anything like a comprehensive study of the psychological and emotional factors, frequent interviews are necessary. These in turn modify the experimental and observational aspects, and introduce a treatment factor which must be evaluated in terms of the transference situation. That this alone exerts an influence on the sexuality of the castrate, has already been shown by Kaufman,³ and is clearly demonstrated in the following case.

A 33-year-old American, married housewife, of Norwegian descent,⁴ had lost both ovaries in 1936 as a result of serous, papillary cystadenoma of the right ovary. She had been married eight years to a Jewish man of about her own age. He is definitely neurotic, suffers from phobias, and has never been much interested in sexual relations, which occurred once or twice every three weeks, up to the time of her operation. He suffers from ejaculatio præcox, prefers to be in the feminine position in intercourse, and has never been able to satisfy her completely. She, on the other hand, has had perfectly satisfactory relations with lovers, and on the whole is a stable, non-neurotic person except for evidence of masochistic trends.

Due to what appeared to be a shaky marriage, and because her cancer made an added complication in giving estrogenic substances, a protracted observation period was decided on, with emphasis on psychotherapy. She has been seen regularly three times a week over a five-month period. The contacts have been in the nature of psychiatric interviews, rather than free association on the couch, but both dreams and transference have been interpreted and worked through as far as the limitations of the approach would allow. The results have been gratifying. The patient, who had been suffering for a year from obstinate insomnia and marked diminution of sexual drive, responded quickly. Insomnia disappeared within a week, and within three weeks there was a marked resurgence of sexuality with frequent intercourse. This died down rather abruptly after six weeks and remained quiescent for a month following the appearance of unmistakable transference elements in associations and dreams. In connection with these, the history of an extra-marital affair lasting from shortly after marriage up to the time of her operation, came to the surface. This, in turn, raised an important point of conflict, namely, whether replacement therapy might not so increase her drive

³ Kaufman, M. R.: *Psychonalysis in late-life depressions*. *Psychoanalytic Quarterly*, 6: 308-335, 1937.

⁴ We are indebted to Dr. James A. Corscaden, clinical professor of obstetrics and gynecology, Columbia University, for this case, and for helpful suggestions during the observations.

that she would be forced into the complications of another extra-marital affair, which she wished to avoid. The wisdom of a prolonged period of observation before instituting replacement therapy was thus amply demonstrated.

Up to the end of the five-month period she has not only held her initial improvement, but also has learned to stand up for her own rights, and shows a poise and calm which is striking. In this period she has had more sexual activity with her husband than at any comparable period during marriage, and on the whole it has been more satisfactory. He, however, has been rather alarmed at her sexual rejuvenation which has led to increased desire to be sexually dominated, and this he is inadequate to perform. Among the dreams there have been three in which orgasm has occurred.

Without going into other interesting aspects of the case, we may point out that it exemplifies the unquestionable rejuvenation of the sexuality of a castrate woman with psychotherapy, and the need of careful study before introduction of replacement therapy.

The second subject, a 42-year-old policeman, was actually the first to be studied and he has been followed for two years. He developed tuberculosis of the genital tract in 1931 which led by February 1938 to the total loss of both testes. He was first seen in March 1938 when a careful study was made of his pre- and post-operative personality and of the environmental situation, to determine his suitability for replacement therapy and as a subject for the experiment.⁵

The subject appeared to be essentially non-neurotic, though there was some question of slight sexual inhibition and of poor object choice in his two marriages. His second marriage, to a widowed interior decorator, took place three years before observation was started. During the first few weeks of marriage intercourse occurred, according to his account, almost daily, settling down to once or twice a week. His wife placed the number of experiences at two or three times a month.

His wife had had her tubes, one ovary and part of the second removed at sixteen years of age. She claims to have reacted normally sexually. Following the patient's discharge from a brief hospitalization in May 1938 for a draining sinus, his wife, who had not been well for the preceding nine months, had a nervous breakdown with diarrhoea as a prominent symptom. Her diarrhoea did not clear up until shortly before her husband's replacement therapy was begun. As it appeared later, this illness was of great importance in her subsequent behavior. Outwardly she appeared cooperative and eager to have the experiment tried. Anxiety symptoms from which she suffered were difficult to interpret, but it seemed probable that they were related to frustration by an impotent husband, or possibly to her own neurotic conflicts.

Another important factor was that they moved to a new home just before replacement therapy was started and took his three children by his first

⁵ We are indebted to Dr. George W. Fish, associate professor of clinical urology, Columbia University, for the two male patients followed in this study and for his continued assistance during the observation.

marriage with them. This was the first time they had all lived together and required new adjustments all around.

The record of what happened to this patient in respect to drug administration may be summarized as follows. Testosterone propionate, estrogenic substance and/or placebos of inert sesame oil were administered over a period of 235 days. This was followed by a 14-day period with no injections. There were four periods, of 28, 49, 58 and 23 days each, during which testosterone propionate⁶ alone was administered; two periods, of 14 and 10 days each, during which estrogenic substances were given; and three periods, of 9, 2 and 14 days each, of sesame oil injections. There was also a period of 28 days of alternating testosterone propionate and sesame oil. In all, androgen alone was given on 176 days, estrogenic substance was given on 24 days and placebos were given on 35 days.

During the first period with androgen (28 days) there was an immediate response in spontaneous erotic dreams, followed shortly by frequent erections, and essentially satisfactory intercourse in a week. There had been no intercourse for two months previously, and in the four months before that it had occurred only three times following his total castration. Without solicitation or even an indication of interest on our part, the subject's flood of spontaneous dreams coincided exactly with the inauguration of replacement therapy. The night after his first injection he dreamed that he had an erection. He was unable to recall anything else, and added that he did not know whether he actually had one or not. The next night he produced another dream:

In this dream he walked up a long staircase preceded by an old man and an attractive young woman. When he reached the top he observed that he was in a night club. He drew six pay-checks from his pocket in order to cash them and to pay the proprietor some money he owed. The old man left the girl and the patient danced with her. He was afraid to remain at the night club because he had so much money on him, the place was a "shady joint," and it was impossible for him to carry his revolver on account of the pain in his side. He suspected foul play and started to leave quickly.

While descending the long staircase he noticed a man lying on the steps as if asleep. Suspecting a ruse, he swung over the banister. The man grabbed him, however, and the two fought on the staircase, fell off and dropped a long distance but were not hurt. As the patient made another effort to leave he was attacked by two more men and was able to best them in the struggle. At the end he found he was holding a long piece of rope in his hand which made him very confident. The alarm clock awoke him.

The subject's associations to the dream brought out the fact that he was somewhat afraid of his own capacity to deal with criminals since his illness,

⁶ The testosterone propionate (perandren) was kindly made available by the Ciba Pharmaceutical Products, Inc., through the courtesy of Mr. Robert Mautner.

and that he would be more likely to use his revolver than formerly. He was surprised to have the six pay-checks because he had never had more than one at a time before. His remarks about the rope brought back his earlier days on a ranch where he was quite expert with the lasso. The symbolism of the staircase is of particular interest because of the varied circumstances under which it may be produced such as in the experiments by Bettheim and Hartmann, quoted by Freud⁷ in which crude sexual stories were told to confused Korsakoff patients. The six pay-checks, "more than he had ever cashed before," seemed to refer to his recent bonanza in the form of medication.⁸ In addition to the occupational derivation of the rope, there would seem to be little doubt that his confidence in holding on to it referred to the return of power of erection. There is a hint of fear of heterosexual pressure with attendant homosexual and castration anxieties.

The subject's frequent and vivid dreams, in paralleling the administration of hormonal products, suggest a new approach to the study of dreams. They tend to confirm Benedek's and Rubenstein's contention that there is a definite relationship between the endocrine tide and dream content and associations. This assumption is also borne out by some unpublished work by one of us in psychologically controlled daily hormonal assays. In this paper we should like to sketch the dreams and reactions which seem to have been rather directly related to the replacement therapy itself.

As a check, however, on uncritically ascribing the psychological picture to the drug alone, and for the further data furnished on the reaction to testosterone propionate, we would like to cite briefly another male subject who has been followed for a year.

One night, this patient, nine days after he had been told that replacement therapy would be definitely instituted, had a series of dreams of having intercourse with his wife in which repeated orgasm seemed to occur. He was surprised not to find evidence of ejaculate the next morning. During a twelve-day period immediately following this, while getting daily injections of inert sesame oil, there was a definite increase of erections over the preceding few months, with a number of erotic dreams. During the remaining period of three and a half months he has received 75 mgms. of testosterone propionate a week. Recorded erections promptly stepped up to one or more a day, and on the twentieth day he was driven to have intercourse by the annoyance of a sustained erection that disturbed his sleep, not by any marked increase of desire. This subject's wife is frigid; and although he has shown some increase in desire, symptoms of ejaculatio retardata, from which he suffered before

⁷ Sigmund Freud: The interpretation of dreams, pp. 361-362. New Revised Edition, 1933, Macmillan Co., New York.

⁸ This same type of symbolism appeared in another patient who, on receiving testosterone propionate had a shower of dreams definitely stimulated by the medication, in one of which he seemed to be a grocer behind the counter with his hands full of bills of one and five dollar denominations. He was distributing these bills freely.

marriage, have returned. His dreams, which have been frankly sexual, have also reflected his mechanical sexual difficulties. He is not so suitable a subject for psychotherapy as the other two cases, and appears, on the whole, to resent the pressure attendant on the revival of his sexual urge. There is some question whether he will persist in treatment unless it is made much easier for him.

To come back to the second subject, on the third day following the beginning of daily injections of androgen, he desired intercourse; but his wife put him off. He felt "jumpy." On the fourth day he had intercourse with sustained erection but without ejaculation. In this period there were erotic, frank intercourse, *Œdipus*, and castration dreams. Two are worth quoting. On the eleventh day, three days before the first complete coital experience, he had the following dream:

There was a boat in the water facing a narrow channel with land on both sides. He emphasized that it was a very small boat. This boat would start upstream and then was pushed back. People on the land, including himself, were trying to keep it from going back. He explained that it was as though there were a strong gale blowing, pushing the boat back, and he and the others waded out into the water trying to get it up into the wind. He did not know just how this came out.

Traces of fear of impotence, in the face of reviving sexual activity due to the thrust of the hormone, appear to be reflected in the dream.

In the last two weeks of this period of 25 days, the patient had successful intercourse ten times, and on one occasion twice in one day. He reported a renewed sense of vigor and the same feeling that he had when he was a young man, and remarked that he and his wife were making up for lost time. There were, however, certain negative trends in the dream material relating to the physician, and continued signs of sexual insecurity, which raised the question whether there might not be some danger of pushing him beyond his tolerance, as the following dream suggests:

He was in a tall building and was chasing a burglar. He thought other people were aiding him. He shot at the burglar but the gun became "loose"—the barrel seemed wobbly and there was no power to the discharge of the bullet.

He reported that he had had several similar dreams through the years. The history of such dreams preceding his illness would indicate a trend which, although accentuated by castration, was a part of the basic personality.

With the idea of resting the patient, and also to get a preliminary indication of his reaction to estrogenic substances, he was next put on small daily doses of estrone—2000 I.U. (Amniotin, Squibb) or 1000 I.U. (Theelin, Parke Davis & Co.). During this period of 14 days, intercourse averaged once every 4½ days. At this point there was a slip in the control technique. The amniotin which was used for a short interval early in the period was of a slightly yellow tinge as compared with the perandren and theelin. All were in the same sized ampules, labeled identically. As the patient gave himself the

major part of his injections, he noted the difference in color and toward the end of the period referred to this. For the first time he expressed doubt as to whether he was getting the usual medicine. There was no appreciable alteration in his sexual pace during the first week of estrogens. A dream that occurred four days after the change is of interest and may have been caused by it. It is full of symbolism with masturbatory and homosexual elements:

He was in the clinic which, however, looked to him like a battlefield because it was wide open and, so-to-speak, in a forest. Many patients were standing around and the doctor, whom he didn't recognize, took the ampule of his medicine and attempted to saw off the cap. The patient requested the doctor to give him the ampule so that he could show him how to do it correctly. The patient sawed off the top of the ampule but apparently did it with such vigor that the contents shot up into the air and were lost.

The subject explained the first part of an eight day period of inactivity, which now followed, with the remark that he thought he and his wife were slowing down to his normal pace. As time went on, however, he became suspicious and mentioned that he thought the medication was different. This same day, without any possibility of his knowing of the change, except as registered by the drug itself, he was put back on androgen. The day following this he had the following dream:

The opening scene was in a building which seemed like a church, or perhaps a gymnasium. There was a priest there, standing next to a huge "3 in 1" oil can. He poured this oil over the patient's head and shoulders, and rubbed it in. The patient laughed because he thought it was so funny and silly.

He left this building, and on the street he met Marie, a girl with whom he had had a love affair just before his second marriage. He told Marie that the priest had poured "3 in 1" oil on him and she was very amused at this also. She said that they should return to the priest and make him change the substance.

They did return and Marie explained to the priest that she thought it was very funny that he should have poured the "3 in 1" oil on the patient. The priest laughed hard himself because he realized it was rather funny. He then took down a bottle of amber colored liquid and began to pour that on the patient's head and shoulders. It began to run off the patient's body and fell on a large table which looked like a butcher's block—although it was much larger than the usual butcher's block. The priest rebuked the patient for allowing the fluid to fall onto this clean block.

The priest took a very large syringe and needle—the needle was six or eight inches long—and injected the needle into the inner surface of the patient's right elbow. The needle went in so deep that it scratched the bone. The patient felt a slight prick as it pierced the skin, but there was no pain other than the recognition that the needle was bumping against bone.

The subject's amusement over the inefficiency of the yellow medicine, his burlesque of the physician, the attendant castration fears, and the fact that he registered the more potent medication with homosexual trends, seem evident. In association he stated that what struck him about the dream was that there was as much sense in rubbing "3 in 1" oil on him as in the injections which he had been getting. He was quite apologetic about his implied criticism of the medication.

During this second androgen period of 49 days, sexual activity returned promptly, averaging once every $3\frac{1}{2}$ days, and although somewhat less than in the first period, was regular, sustained and probably slightly above his normal pace of once a week. He commented that ejaculations were becoming "freer and smoother" as when he was young and that he noted that his muscles were firmer and harder in tone. In spite of the performance, however, and in addition to many erotic dreams, his dreams also continued to show castration anxiety and disguised negative trends toward the psychiatrist.

During this period there were changes in the wife's physical condition and attitude, the significance of which became apparent only later. During the middle of the period he reported that his wife was unwell from a cold, following which she continued to have bronchitis, diarrhoea and vomiting over the next few weeks. Toward the end of the period there was a definite break in the mutuality of feeling which had been present at first in regard to intercourse. The perandren honeymoon seemed definitely over. The patient, however, continued to show growing confidence in his own sexual performance.

It had been determined to institute a period of injections of inert sesame oil as a prelude to strong doses of estrogenic substance, in an attempt to determine any physical and psychological variations that might result. This time was chosen because his wife did not seem well or to want much activity. The subject was given blanks for nine days. His sexual drive continued into this period, and on the fourth day, although his wife did not desire intercourse, he "felt so much like a bull" that he went ahead. The day after this his son broke his leg, which led to complications that preoccupied the subject and his wife for some weeks. The placebos were followed by a ten-day period of daily injections of 10,000 I.U. of α -estradiol benzoate (progynon-B, Schering Corp.), a change which the patient did not suspect. After the last-mentioned intercourse, 14 days followed without a further attempt at relations, during nine days of which he was getting estrogen. The subject attributed this lapse to his wife's ill health, his son's accident and his own external preoccupations, maintaining that he was able to function at any time. A few days preceding the next attempt he had a number of dreams, however, indicating a strong unconscious insecurity. On the ninth day after starting estrogens, both he and his wife desired intercourse. He reported that this turned out to be a complete failure; he "had to tuck the penis into the vagina because it wasn't erect enough to be pushed in." His wife had an orgasm but his mild erection promptly disappeared. His wife awakened the next morning with a dream

in which the doctors were injecting him with glycerine and water. He was amused at the dream because he felt that it revealed her attitude toward the medicine as well as his own. He was a good deal upset because this represented the first definite failure at intercourse since the institution of replacement therapy, and for the first time he realized that the reasons he had given for lack of performance were chiefly rationalizations of his own existing sexual incompetency.

During the next period of 58 days he received 25 mgms. of testosterone propionate daily, and intercourse occurred only four times, an average of once every $14\frac{1}{2}$ days. There were numerous factors which seemed to contribute to this. His wife constantly complained of fatigue, showed other signs of physical incapacity and had difficulty at her job and with the children. Also, his son's leg was not doing well. It was 19 days after the institution of this series of androgen, and 36 days after the last successful intercourse, that he had his next experience. The circumstances immediately leading up to this are of considerable interest. On the thirteenth and fourteenth days of androgen he reported a feeling of tenseness and jumpiness such as he had experienced at the very beginning of the replacement therapy. He remarked that it was the same sensation that he used to experience years before in the Navy when in charge of a battleship gunnery and preparing to fire the first shot. Marked aggressive trends then appeared in his dreams. In one he knocked a man unconscious with a plank, and on the night preceding intercourse he knocked out the false teeth of a former lover of his wife.

During the whole of this period he felt little sexual attraction toward his wife who had become physically repulsive, although he was constantly stimulated by women outside. Half way through the period he and his wife had a quarrel in which he told her she could have a separation if she wished it. Although there was relatively little sexual performance, he maintained that he felt as though he were having "the good medicine" and would be able to have relations if his wife seemed more desirable.

In this communication we do not have time to go into any detailed discussion of the remaining periods. In a series of 28 days of androgen alternating with blanks, he had intercourse only once. During this time he reported that his wife had been "delirious," and from the account, she seemed actually to have been hallucinating on one occasion. During a period of 14 days of placebos there were no relations, but in the succeeding series of 23 days of androgen he seemed to have fallen back into his normal sexual pace with four experiences, averaging once every $5\frac{1}{2}$ days, one of which was extra-marital. An interval of 14 days with no treatment was followed by implants of testosterone propionate. Sexual performance occurred only four times in the six-month period which terminated with the extrusion of the second implant. He was not followed with interviews as frequently as during the period of regular daily injections. There seemed to be good reason for his failure. In June 1939, at the time of the first implant, his wife was admitted to the hospital and found to be suffering from cirrhosis of the liver

and toxic hepatitis. It was then further discovered that she had been drinking regularly by herself since her nervous breakdown four months before the beginning of replacement therapy, often consuming as much as a pint of hard liquor a day. She improved somewhat following her discharge from the hospital in June 1939, but soon relapsed, presumably in the face of constant difficulties with her superior in the department store.

In January 1940, his wife was told that her hospital bill would be paid by the store because of her long and faithful service. When she presented the bill for several hundred dollars, it was explained to her that this would be covered as promised, but that should she have another illness of the same sort, the store would not be responsible. Should she, however, have some entirely different incapacity, "such as a broken bone," they would cover the expenses. The following day, while carrying several bundles, she fell on an icy street, and subsequent x-rays showed a fracture of the third cervical vertebra. This necessitated hospitalization and an extended period in bed at home in a body cast. She went back to drinking a half pint of hard liquor a day which she insisted on ordering from her bed. In the face of this real external difficulty for the patient, it was decided to discontinue replacement therapy for the time being.

In the last case, the question of gross fluctuation in sexual performance while receiving replacement therapy requires some explanation. (See chart.) A marked slump occurred during the middle of the observation period, returning to about the normal sexual rhythm during the last androgen series. One possibility is that patients may develop a tolerance to the drug and require a periodical increase of dosage. This is not probable, but merits further investigation. Worthy of serious consideration is the shift in ego position due to loss of testes, and influences bearing on this. One would expect the castration complex to reach a new equilibrium with a greater degree of feminization. The transference, under circumstances of treatment, cannot help becoming strong. Increased sexual pressure, either from the hormone or transference or both, tends to impel such an individual in the homosexual direction. This subject identified the psychiatrist with the genitourinary surgeon who removed his testes. The physician's rôle in the experiment, with his actual control of the sexual substances received, would further emphasize his position as the powerful and castrating authority. This may explain the fact that almost all of the fifteen transference dreams showed strong negative

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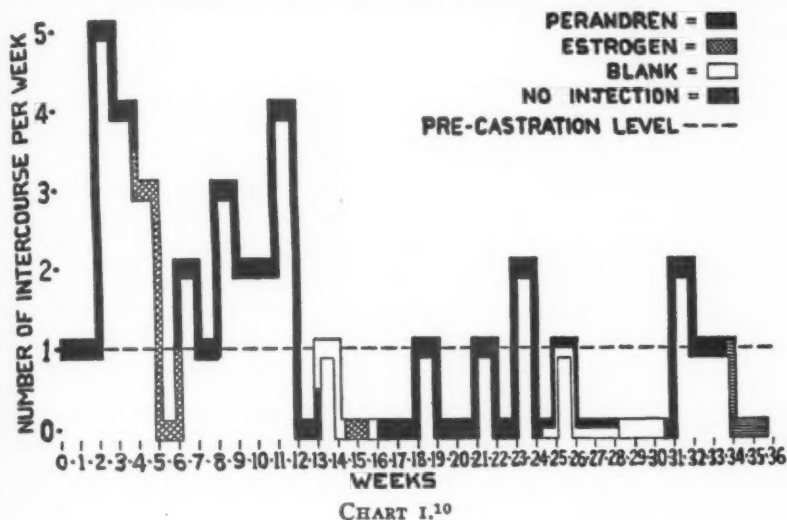
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trends.⁹ It is possible that these negative trends had a definite influence on performance, and that if the approach had been made more from a psychotherapeutic than from an observational point of view, the results might have been more consistently satisfactory. Equally, if not more, important were the disturbing external circumstances, particularly the serious neurosis of his wife.

FREQUENCY OF INTERCOURSE BY WEEKS



CONCLUSIONS.

1. Replacement therapy should be preceded by a careful pre- and post-operative personality study and prolonged observation.
2. Psychotherapy alone may enhance sexual expression in castrates—as was strikingly demonstrated in a woman patient.
3. In a carefully controlled situation, regular intramuscular doses of testosterone propionate definitely increased signs of sexual activity in two male castrates.

⁹ This aspect of the case has been more thoroughly dealt with in "Sex hormones and psychic conflict—A case report." Edward S. Tauber, M.D., and George E. Daniels, M.D., *Psychosomatic Medicine*, October, 1940.

¹⁰ The androgen employed was testosterone propionate (Perandren, Ciba).

4. The form which this expression took was apparently determined by the following factors: the patient's post-operative psychic make-up, the nature and handling of the transference relationship, and the nature and vicissitudes of the reality situation.

5. In some cases combined psychotherapy and replacement therapy seems indicated.

6. Replacement therapy under psychiatric observation stimulates dream production, which furnishes a valuable check on treatment and suggests a new approach to the study of dream symbolism.

THE EFFECTS OF TESTOSTERONE PROPIONATE IN IMPOTENCE.*

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AND

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By impotence is meant the inability of a man to perform the act of coitus successfully. This may be complete or partial and may result from disturbances in any one or all of the functions upon which normal intercourse depends, namely, sexual desire, erection, ejaculation and orgasm. The cause of such disturbances may be either organic or non-organic, or a combination of both. Impotence may be the patient's only complaint or may be accompanied by other symptoms, which may be confined to the genito-urinary system, be related to one or more of the other organ systems of the body, or to complaints like anxiety, fears and depression.

Among the manifest organic determinants of impotence may be included: malformations of the external genitalia, failure of sexual development beyond the childhood level as seen in eunuchoidism, absence or atrophy of the testes, other diseases of the genito-urinary tract; diseases of the central nervous system, general debilitating diseases, old age, toxic factors such as alcohol and conditions which offer mechanical impediments to coitus.¹

We are not concerned here with patients in whom there is such definite organic etiology. Our interest is focused upon those patients in whom thorough physical examination and laboratory studies, including all indicated special tests, reveal insufficient or no evidence of: firstly, decisive structural changes in the genito-urinary apparatus; secondly, obvious endocrine dysfunction; and thirdly, demonstrable neurological disorder. Into this group fall the greatest number of patients who suffer from impotence.

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Inability to explain the poor sexual performance on the basis of known and measurable physical changes confronts the physician with the necessity of making further investigations to establish its origin. Some may solve this problem for themselves, but not for the patient, by invoking the aid of indeterminate constitutional factors, or by placing their reliance upon the argument that when we have more delicate and accurate methods of examination we will be able to give the answer. Others may seize upon minor deviations from the norm in the genito-urinary tract, for example changes in the verumontanum or prostatic urethra, and will vigorously contend that these findings are the primary source of the sexual incapacity.^{2, 3b} Still others will postulate a gonadal or other endocrine deficiency. Additional hypotheses include: the concept that impotence is a result of exhaustion or hyperirritability of the "sexual centers" in the spinal cord;^{3a} the belief that there is a weakness of the muscles of erection and ejaculation,^{3a, 3b} and the idea that bad sexual technique is the major element in the complaint. Many physicians will take the attitude that the majority of cases of impotence are due to purely psychic or emotional causes.

In actual practice each patient with sexual impotence presents a highly individual problem. It is essential that each case be thoroughly investigated. The investigation must include, in addition to a complete physical study, a thorough-going survey of the patient's personality make-up, his past and family history, and his immediate environmental situation, paying special attention to his psychosexual development and his sexual experiences. The necessity of making such a methodological approach has been emphasized many times.⁴⁻⁷ While many authors have recognized the importance of both organic and psychological factors some appear to neglect the latter and to favor the former;^{2, 3, 8} while others have laid more stress upon psychic and emotional influences.⁹⁻¹¹

The rôle of minor changes or abnormalities in the genito-urinary apparatus in the production of impotence has been discussed many times. It has been pointed out by Hohman and Scott⁴ that these slight pathological changes are frequently the result rather than the cause of the sexual incapacity and that such deviations from normal are so often present without accompanying symptoms that their importance should be discounted. These authors attempted to specify what constitutes adequate local organic etiology, but also

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stressed the point that there is no necessary connection between impotence and such pathological conditions in the prostatic urethra, verumontanum, prostate, seminal vesicles and ejaculatory ducts. They felt that these changes are more frequently the foci for disabling neurotic concern than the specific organic causes of the impotence.

The psychic and emotional influences which may be of etiologic significance may be relatively clear and simple or extremely complicated. It is easy to understand the disabling effects of acutely disturbing emotional events upon sexual competency. Severe anxiety or marked depression are frequently accompanied by a temporary decline in sexual ability. Marital discord is a not uncommon cause. Frigidity in the sexual partner may play a large part. Conscious fears of venereal infection, of pregnancy, or of being caught in the act are very often encountered as deterrents to adequate sexual performance. Or the impotence may be associated with perversions like fetichism and homosexuality. A patient may, as a result of a rigidly puritanical upbringing, have developed the attitude that sexuality is wrong or is disgusting and may therefore inhibit all sexual expression. An emotionally traumatic experience in childhood such as seduction by an adult, or an unfortunate outcome of the first attempt at intercourse, such as failure through anxiety or acquisition of a venereal disease, may condition the person against successful cohabitation thereafter. Failure of a man to emancipate himself from his dependency upon his parents and family or to break off a too close attachment to his mother or to a sister may make him incapable of forming normal sexual attachments to other women.

Psychoanalytic investigations have led to the opinion that many cases of impotence are occasioned by fears and wishes of which the person is not consciously aware; and to the conviction that this may be true even in those cases where a fully conscious reason seems to offer an adequate explanation. Thus, many cases are thought to be due to an unconscious sensual attachment to the mother which is inhibited by guilt and the fear of being hurt or punished.^{12, 13} This attitude is transferred to all women and leads to so strong a repression of sexual impulses that the individual may entirely eschew sexuality. This unconscious conflict may also express itself by making men unable to cohabit with women whom

they admire and respect as they do their mothers or sisters, while they may be completely potent with women whom they consider degraded, for example, with prostitutes.¹⁴ It has been suggested that failure of erection may unconsciously mean a denial of masculinity and a feminine identification.¹⁵ It has been said that ejaculatio præcox may indicate, in addition to a feminine identification, an unconscious desire to thwart or soil the woman, and an equating of ejaculation with urination.¹⁵ A deeply rooted narcissistic orientation of very long standing has been thought at times to be concealed behind psychic impotence.¹⁶ Strong feelings of guilt connected with masturbation¹⁷ have been pointed to as another factor in ejaculatio præcox. Thus precocious ejaculation has been interpreted as evidence of compliance with the prohibition of masturbation in that the patient can avoid touching or can shorten the time of his touching the genital organ.¹⁸

There is a wide range in the methods of treatment employed for the relief of impotence. These include the following procedures: Prostatic massage, urethral instillations, passage of sounds, cauterization, etc.; the use of endocrine products, the implantation of testicular grafts, and ligature of the vas deferens; abstinence from sexual play or coitus for periods up to several months and the exhibition of sedative drugs; the employment of stimulating measures of a local and general nature; surgical techniques such as plastic operations on the so-called muscles of erection and ejaculation, and lumbar sympathectomy; superficial forms of psychotherapy like suggestion, reassurance and persuasion; active attempts to correct environmental difficulties of a familial, social, economic, marital, religious or occupational nature; and so-called deep or intensive psychotherapy such as psychoanalysis in an effort to bring out and resolve the unconscious mental conflicts which are thought to have brought about the impotence.

Undoubtedly, improvement or apparent recovery occurs in many patients. This may happen no matter what form of therapy is used. For in all therapeutic methods there is inherent some degree of psychotherapeutic influence. Thus, successful results after local treatment to the prostatic urethra may be due to suggestion and to the influence of the confidence the patient has in his physician. The conflicting reports in the literature render it difficult to estimate accurately the degree of success or failure that has been attained

by any one of the above methods. Some physicians prefer to use a single method; while others are eclectic and utilize a combination of several therapeutic measures. The present consensus of opinion appears to be that there can be no hard and fast rules or methods of treatment applicable to all cases. Each case must be handled individually. There is, however, a tendency to emphasize the greater importance of psychotherapeutic measures, and to place less dependence upon local, endocrine and operative treatments.

A brief discussion of the rôle of the endocrines in male sexuality seems appropriate at this point. In the great majority of animals thus far studied the evolution and maintenance of sexual behavior depends in great part upon testicular activity.^{19, 20} Satisfactory detail concerning mammalian forms is available chiefly for rodents. If rats or rabbits are castrated before puberty no manifestation of sexual interest appears. If castration is performed after puberty there is a gradual waning of the impulse and ability to copulate until extinction is complete for all individuals after the eighth month in the rat and after the fifth month in the rabbit.²⁰ The persistence of some degree of sexual interest and capacity in certain individuals for months after castration, however, is of considerable importance since the atrophy of prostatic and seminal vesicular epithelium indicates the virtual disappearance of testicular secretion from the organism within two weeks.¹⁹ In the guinea pig certain masculine calling and mounting reactions persist for long periods although the power of securing intromission is lost,²¹ even when orchidectomy is performed at the age of 30 days, that is before puberty.^{22, 23} The reflex pattern in the nervous system once established apparently disintegrates but slowly when testicular influence is withdrawn. In all of these rodents, testosterone propionate promptly revives or intensifies the copulation urge and capacity of the castrate animal,²³⁻²⁷ or initiates them in rats and rabbits if castration has been performed before their natural emergence.^{26, 27} Within a few days after the discontinuance of treatment in the rat the copulative urge again wanes and is extinguished in from two to four weeks.²⁵ When the normal sex interest fails to mature in the rat, a phenomenon which may be associated with poorly understood genital defects, testosterone propionate establishes it and procreation may proceed.²⁸

Data on the relationships between the testis and sexual activity in monkeys and apes is scant. Bingham²⁹ describes intromission, accompanied by rhythmic pelvic movements, during play in the immature chimpanzee. Castration of the mature *Hamadryas* baboon in the hands of Zuckerman and Parkes³⁰ resulted in the recession of its aggressively masculine attitude in about six months accompanied by decline in the frequency of erections. Treatment with testosterone propionate restored both the aggressive attitude and the sexual interest. An immature male drill similarly responded to testosterone propionate by developing the strut and aggressive mannerisms of the adult accompanied by increased frequency of erections. It is noteworthy that for eighteen months after the discontinuance of injections, these characteristics as well as sexual interest continued unabated along with certain morphological modifications, although the testes examined at the end of this period were still immature. In summary the authors note that the capacity for erections while increased by androgens is not altogether dependent upon them.

In the human child reflex erections of the penis are well known and fragmentary orgasm at least may be aroused by manipulation long before puberty. It may well be doubted whether the minute amounts of androgens excreted in the urine during this period represent a physiologically effective testicular secretion. It must be granted, however, that descent of the testes during the latter months of gestation is best interpreted as due to androgens, so that exposure of the nervous system to their possible influence is presumably provided for at this time. It is thus impossible to exclude hormonal factors from a rôle in the determination of the infantile sexual nervous pattern.

There is very little knowledge concerning the influence of prepuberal castration in man on sexual activity. Castration in the adult is well described by McCullagh and Renshaw.³¹ Their twelve eunuchs showed a reduction in desire and potency in all, with partial retention of potency in six, and partial retention of desire in three. The persistence of a degree of potency with at least a semblance of orgasm for years in certain individuals has been long known. Tandler and Grosz³² described such as enduring for twenty years in a Skopek. Hammond³³ cites several instances, and Rowe and Lawrence³⁴ revived the faltering sexual power of a castrate

by simple reassurance. We,³⁵ as well as many others, have noted retention of the capacity for erections, and some desire and capacity for intercourse in eunuchoids possessing minimal secondary sex characters and impalpable prostates. Whatever the original differentiating agent may be, the established nervous mechanism of the sexual act in man seems often capable of operating to a variable extent in the absence of the testes.

Testosterone propionate has been repeatedly shown to substantially enhance the frequency of erections, desire and capacity for intercourse in eunuchs and eunuchoids^{36-38, etc.} and to increase the frequency of erections and sexual interest in children.^{39, 40} As such it constitutes replacement therapy or stimulation of a mechanism before its normal time. The question of the usefulness of androgens in the treatment of impotence in man without obvious endocrine disorder must properly be divided into two portions. The first of these deals with the possibility of overlooking real and responsible testicular defect in the usual clinical examination and accordingly unwittingly providing replacement therapy with androgens. After castration or after the discontinuance of testosterone propionate in the hypogonad, the deep voice remains, the penis does not recede to a recognizably hypoplastic state, hair falls out slowly and irregularly and considerable amounts of inactive prostatic tissue may remain. It is therefore quite possible that considerable reductions in the amount of testicular secretion for fairly long periods of time may go unrecognized if observation is confined to such sluggish and imperfectly measurable criteria of testicular activity. McCullagh and Lilga⁴¹ in their recent important review of androgen assays have cited six patients that illustrate this point very well. These men, of whom five were specifically stated to be impotent, suffered from testicular damage during adult life, often from orchitis. In no instance were the secondary sex characters or prostatic size abnormal. But androgen assays gave values for urinary excretion ranging from 3 to 19 International units per day, averaging 14.5, as compared to the normal range found by these workers of 18 to 86 International units per day, with an average of 37.8. It is clear that there is a strong presumption here for the existence of an organic testicular responsibility for the impotence, not revealed by inspection of the secondary sex characters. Functional disturbances of testicular hormone pro-

duction with seminiferous tubules not so grossly damaged as to be apparent to rough external examination are quite possible and would be practically impossible to assess by means of the usual clinical studies. It would be very easy indeed in such instances to regard the impotence as being based entirely upon a psychogenic etiology, especially if there is evidence of neurotic conflicts. The usefulness of androgen assays in facilitating the study of such patients is not fully explored, but the considerable variation in the range of normal values, the inadequacy of the data for many age groups, and the uncertainty still surrounding the amounts present in the absence of the testes will limit their value to some extent.

It is commonly stated that when the testis is normal no influence of testosterone propionate upon sexual excitability would be expected. Such a view is contrary to experience with other hormones in which hypernormal effects are common enough. Neither is it proved that such hypernormal effects might not be beneficial to patients with impotence even of psychic origin if they could be secured. One of us in conjunction with other colleagues⁴² demonstrated that certain of the metabolic influences of the androgens, reduction in the urinary excretion of salts, water and nitrogen, could be observed in normal young men with testosterone propionate 25 mgm. per day, but no influence on sexual excitability was produced in the two subjects used. Howard and Vest⁴³ similarly observed no enhanced sexual reactions in several normal young men. Rubinstein and Kurland⁴⁴ also noted no definite effects in eight normal adult men. There is, however, no recorded experience with heavier doses, as 50 mgm. or more per day.

There are some isolated reports of the effects of androgens in the type of impotence in man in which there are no demonstrable changes in the genito-urinary apparatus or in the endocrine and central nervous systems. For the most part these are inconclusive because of the small number of cases or inadequate description of the circumstances under which the experiment was carried on. Hamilton⁴⁰ reported good results in one case. Miller, Hubert and Hamilton⁴⁵ described improvement in two patients with psychogenic impotence. Turner⁴⁶ noted improvement in sexual potency in one patient when testosterone propionate was given: decline of potency when sesame oil was substituted; and subsequent return of potency when testosterone injections were resumed. He ap-

parently viewed this as an example of replacement therapy. Eidelberg⁴⁷ stated that there was striking improvement in a man who received five injections of 25 mgm. each of testosterone propionate every second day, and then four injections of 50 mgm. each in twelve days. Howard and Vest⁴³ considered the improvement in potency in one of their patients as probably due to suggestion, since good subjective results were noted under both sesame oil and testosterone propionate. Rennie, Vest and Howard⁵ observed no improvement in eight cases of psychic impotence treated with testosterone propionate. In approximately 50 other impotent patients, the impotence resulting from a wide variety of causes, no instance of sexual stimulation was observed as a result of this therapy except in one or two elderly patients, in whom the authors believe that deficiency of male hormone may well have been a factor. These 50 patients were not studied in as great detail as the other eight cases. No change in symptoms was noted in a male homosexual patient under similar treatment. These authors concluded that if the factor of suggestion is ruled out, it seemed unlikely that male hormones in doses adequate for excellent responses in hypogonad patients offered any therapeutic help in psychic impotence.

METHODS AND MATERIALS.

We have used testosterone propionate* in eighteen men who showed no obvious endocrine dysfunction, no evident neurogenic disease, and no marked structural changes in the genito-urinary tract, but who complained of varying forms and degrees of impotence. These patients were subjected to a thorough physical examination, endocrine and urologic investigations, although cystourethroscopic examinations were not done, and a psychiatric study before injections of testosterone propionate were begun. In some of the patients the impotence appeared to be purely psychogenic. In others an acceptable psychodynamic explanation could not be formulated on the basis of the available data. Some of the psychic and emotional influences noted earlier in this paper were found to

*We are indebted to Drs. Gregory Stragnell, Erwin Schwenk and Max Gilbert of the Schering Corporation for the supplies of testosterone propionate which were used in this study.

be operative. Since we did not make an exhaustive psychiatric study or psychoanalyze these patients, it is probable that we failed to disclose important emotional conflicts in many of them. We attempted to avoid psychotherapeutic effects by making no direct attempts at psychotherapy during the course of the experiment. It was explained to all subjects that since no obvious physical cause for their impotence had been found, it was reasonable to assume that emotional factors played some part in producing it. We also informed them that we did not know what the effects of testosterone propionate on their impotence might be. We did mention the positive results obtained in eunuchoids and in prepuberal boys.

The eighteen subjects ranged in age from twenty-one to sixty-one years. Twelve were married and six were single, though one of the latter was married during the time he was under treatment. Lessened desire, failure of erection, premature ejaculation and lack of satisfactory orgasm all occurred singly or in combination. One patient was sterile. Nine had had children. Of the remaining eight, five were unmarried and one had not wanted children. Of the other two one was childless due to his almost lifelong impotence, while it was not clear why the second had had no children.

Testosterone propionate was given by intramuscular injection three or more times weekly in doses of 25 mgm. The total amount given varied from patient to patient. The maximum was fifty-one injections and the minimum ten injections. The courses of testosterone propionate injections were interrupted by control periods when injections of sesame oil were given without the subject's knowledge that he was receiving something different. At other times there were periods of observation during which no injections were given. In some instances the experiment was begun with a series of testosterone propionate injections, while in others sesame oil injections were used first. The patients were observed in the clinic on the average of once every two to three weeks. In some patients sperm counts were made before, during and after the course of injections. Assays of the urine for excretion of hormones were not carried out.

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REPORT OF CASES.

CASE I.—A 33-year-old office manager complained of inability to have satisfactory intercourse with his wife. He had difficulty in obtaining and in maintaining erections and suffered from premature ejaculations. He was potent with prostitutes. He had experienced ejaculatio præcox on all attempts at coitus before his marriage. For two months after marriage erections were poorly sustained and ejaculation was at times premature, but thereafter he was sexually competent until the onset of his present complaint four years preceding his first consultation with us. Then there had been brief periods during which he was unable to cohabit successfully. At about the same time he was worried over business matters. One and a half years before he was seen by us his impotence had become much more marked. Injections of a preparation of sheep testis had seemed to induce some improvement. He was able to have successful coitus once or twice a month; although for periods of two to three weeks he would find himself incapable in spite of sexual desire. When first examined, he had not had intercourse with his wife for six weeks. Physical examination and laboratory studies revealed no evidence of physical disease. He felt that it was unfair to his wife for him to be impotent with her. His wife had never been very active in sexual congress, in contrast to the activity of the prostitutes whom he had frequented. He held his wife in high esteem, and said she was willing to do anything for him and that she never went anywhere without him. Though he had thought of sex as something not quite nice, he had always been sexually stimulated by the sight of feminine undergarments, and when he saw an attractive woman would phantasy her as undressed. He was inclined to explain his impotence either on the grounds that there was rhythmicity in his sexual desire similar to that in animals, or on the basis of some organic factor which had not been disclosed by physical examination. In the first two weeks of treatment he was given six 25 mgm. injections of testosterone propionate. A few days after the injections were begun he noted considerable increase in frequency of erections and in sexual desire, and felt more buoyant, aggressive and self-confident. He had successful intercourse daily during the second week. For five weeks after this he received injections of sesame oil three times weekly. He claimed that during this time there was some decrease in frequency of erections, in sexual desire and in the feeling of well-being, with a reduction of coitus to once every seven to ten days. Testosterone propionate injections were then resumed for three weeks until nine more doses had been given. There was some increase in erections, but desire remained unchanged and the feeling of well-being was less marked than during the first two weeks of treatment. For seven weeks thereafter he received no injections. He found himself able to have successful coitus two to three times weekly and impregnated his wife. When he was seen at a follow-up interview nine months later his potency had continued to be satisfactory and he had no complaints of any sort.

CASE 2.—A 46-year-old business executive complained that he had never had satisfactory intercourse with his wife during twenty-two years of marriage. Sexual desire had always been infrequent and had become more so as the years had gone on. For six years before he first consulted us he had had no sexual desire and had had coitus very infrequently. At coitus he had had erections, but had experienced a burning feeling in his penis during the act, and with orgasm had had a flow rather than a spurting of semen. He had not had intercourse for the six months preceding his first visit to us. He had never been able to express readily his affection for his wife. He had always felt uncomfortable when left alone to entertain a woman. His social life had been confined mostly to activities in company with his men friends. Masturbation which was begun at twelve was given up after a year due to feelings of guilt. He had first had intercourse at eighteen, when he had accompanied some other boys to a house of prostitution. He obtained no enjoyment and reacted with disgust to the experiences. He had always been known to his friends as a man who would never make sexual advances to women. He had been highly successful in business but was overconscientious, perfectionistic and over moral. He came for treatment as he felt that his sexual inadequacy was responsible for his wife's irritability and "nervousness," and because he believed that he was too young a man to have lost his sexual competency. He had received prostatic massage for three or four months without any improvement in his sexual capacity. In addition to the impotence he complained of fatigue and lassitude. He attributed all these complaints to a chronic nasal sinusitis of twenty years' standing. He had a long history of medical treatment for varied complaints, some of which had been of a serious nature, and some of which had been neurotic in character. Physical examination and laboratory studies were essentially negative, except for folliculitis decalvans and a mild chronic prostatitis. Treatment was begun with twenty-seven injections of testosterone propionate of 25 mgm. each, three injections weekly, over a nine-week period. Not until the third week did he notice any change. He had successful intercourse for the first time in six months during the fourth week. In the seventh, eighth and ninth weeks he had intercourse once weekly, but there was no feeling of ejaculation with orgasm. He reported that he had more energy and that he was more interested in his work. Thereafter the feeling of well-being and the relative potency continued under sesame oil injections for three weeks, for a period of four and a half weeks when he received no injections, for another two-week period with six injections of 25 mgm. of testosterone propionate, and for a final period of two weeks without injections. There was some diminution in erections, sexual desire and frequency of coitus when he received sesame oil, but he was more aware of ejaculation at the time of orgasm. Erections were less frequent and desire diminished when he was receiving no injections, but the feeling of well-being persisted unchanged. When he was seen at a follow-up interview six months after the injections were discontinued, he reported that his potency had remained satisfactory, that he was feeling very well in general and that he was no longer so concerned about his health.

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CASE 4.—A 39-year-old steelworker, who had aspermia, small testes and a congenital absence of some of the muscles in his left leg and in his right pectoral region, complained that during the preceding six months he had gradually lost his sexual desire, had had poorly sustained erections, premature ejaculations and a scanty amount of ejaculate. He was inclined to the belief that his work as a brass welder for the previous one and a half years had affected him in some way. Physical examination and laboratory studies, including X-rays, showed (in addition to the findings noted above) that he had a minimal osteoarthritis of the lower thoracic and lumbar vertebræ, and that neurological examination was essentially negative except for a sluggish left knee-jerk and an absent left ankle-jerk. There was no history of disease or injury of the testes. Before his marriage at thirty his sexual experience had been limited to occasional masturbation. He had always been shy, conscientious, a hard worker and somewhat slow in his reactions. He and his wife had wanted a child and had been much disappointed when his sterility was discovered. Three days after testosterone propionate injections were begun he had successful intercourse. During the first four weeks of treatment, when he received a total of fourteen injections of 25 mgm. each, there was increasing potency to the point of satisfactory intercourse on six or seven occasions, pronounced increase in sexual desire, well-sustained erections and no premature ejaculations. When sesame oil was substituted for the testosterone propionate for the next three weeks, he noted a falling off in desire and poorly sustained erections. Renewal of testosterone propionate injections at this time for three weeks resulted in the return of full potency. Then injections were discontinued for nine weeks. There was an immediate decline in potency with almost complete impotence at the end of the nine-week period. Sesame oil injections at this point produced no improvement. But when testosterone propionate injections, eighteen in number, were resumed, potency returned once more. Another period without injections was again accompanied by increasing impotence. Treatment was resumed again with relatively little effect and then was stopped at the request of the patient. We were convinced that he had shown some dependency upon the testosterone propionate. But when he was seen one month later he reported that he was having satisfactory intercourse twice a week.

CASE 8.—A 21-year-old unmarried steelworker complained of inability to sustain erections, loss of sexual desire, and absence of nocturnal emissions. Four months before he had failed to maintain an erection when he attempted coitus with his fiancée. Subsequent attempts with prostitutes and with other girls were unsuccessful, as was a further attempt with his fiancée. He had had intercourse for the first time at nineteen when he visited a house of prostitution in company with other boys. Although he had succeeded he did not care particularly for the experience. At about this time he had met his fiancée, whom he says was a virgin. They had successful coitus on four occasions. Marriage had been planned, but was postponed when the patient first failed at coitus. He worried greatly about his impotence thereafter. He continued to have occasional morning erections. In addition to impotence he complained of

fatigue of one year's duration and of paræsthesias just above the penis. Physical examination and laboratory studies were essentially negative. Sixteen injections of 25 mgm. each of testosterone propionate were administered over a four-week period without any effects. During the next three weeks no injections were given. Then nine injections of testosterone propionate were given in two weeks with no results. After six more weeks without injections there was no change in the impotence. The patient had not tried to have intercourse. He admitted that he had sexual feelings but said he was afraid to attempt coitus as he knew he would fail. He reported that he had masturbated five or six times and had had erections, ejaculations and orgasms, accompanied by phantasies of his fiancée naked or of having intercourse with her. He said that masturbation had not given him enough satisfaction. When he was seen again two weeks later no change had occurred in his sexual capacity. He said he had broken off his engagement and had foresworn intercourse. He insisted that there must be a physical cause for his impotence. Five months after this at a follow-up interview the patient reported that his impotence had persisted and that he had resumed friendly relations with his fiancée.

CASE 9.—A 33-year-old unmarried postal clerk complained of: poorly-sustained erections and lack of sexual desire for the preceding eight years; lifelong fatigue and feelings of inadequacy; a light beard and a high-pitched voice. Physical examination and laboratory studies were essentially negative. He had never had intercourse. When he was eight years old he was circumcised because he was having frequent erections. At fourteen his mother found him masturbating and warned him that he would be damned if he continued the practice. Masturbation was continued until nineteen. The act was followed by a feeling of weakness and fatigue. He had avoided coitus due to lack of desire for it, fear of venereal disease, fear of being found out, and fear of making the woman pregnant. For the past four years he has been friendly with a woman one year his senior, with whom he has indulged in mutual masturbation on the initiative of the girl but with no satisfaction to himself. He was afraid to assume the responsibilities of marriage; felt that he could not satisfy a wife sexually and feared intercourse would exhaust him. He had always been much concerned about his physical health and had thought that minor illnesses affected him more severely than other people. He was given nine injections of 25 mgm. each of testosterone propionate in November and December, 1938, with no results. When he returned nine months later he still had no desire for intercourse and infrequent erections, voiced a wish to get married and asked for further treatment. After nine doses of testosterone propionate over a period of three weeks he reported that he had had more energy and courage, more desire for women, and for the first time a wish for coitus with his "girl friend" on two occasions, though he did not attempt it. There had been no increase in frequency of erections and no nocturnal emissions. When fifteen more injections had been given in the following five weeks he reported still greater self-confidence and well-being; and said that morning erections had occurred daily for the last two

weeks of this period, that he had had two nocturnal emissions and that he felt he could now have successful intercourse if he tried. Four weeks of sesame oil injections were now tried. Morning erections disappeared and there was no sexual desire. He had made no attempt at intercourse. After three more weeks without any injections, he reported that he had no desire, but that he was still planning to be married. Two months later no change had occurred in his condition.

It was in this patient that a marked reduction in the sperm count was observed during treatment with testosterone propionate. Before injections were begun the sperm count was 150,000 per c.m. After nine doses the count was 100,000 per c.m. After six more doses it was 50,000 per c.m. The final count after twenty-four doses was twenty sperm per high power field, none of which were motile.

CASE 16.—A 48-year-old married salesman complained of unsustained erections and ejaculation without orgasm. Physical examination was essentially negative except for a blood pressure of 188/108 and a somewhat enlarged prostate. He had first had intercourse at about sixteen with a prostitute. This was successful, though he was afraid and did not obtain an erection until his penis was handled by the girl. He contracted gonorrhœa on his second visit to a prostitute and never had fully successful intercourse thereafter. He was married for five years from twenty-four to twenty-nine but never had intercourse with his wife. He did not obtain an erection at all and only once did he have an ejaculation which was with an unerect penis. His wife was frigid and had said she did not care whether a man had a penis or not. She divorced him because of his impotence. He was unmarried for the next ten years. During that time he enjoyed making sexual advances to girls, but had no erections and never tried intercourse. He did have nocturnal emissions once every three or four months. His second marriage had been in 1928 to a woman eight years his junior who had had her ovaries removed. He had been able to have intercourse with her if she held his penis and inserted it. But coitus had not been satisfactory and his wife had been dissatisfied without orgasm. He frequently had failed to achieve orgasm with ejaculation. He had had morning erections. He had received injections of pregnancy urine extract without benefit. His wife had appeared to get more satisfaction after she had received injections of theelin. He and his wife had always found that intercourse seemed to be more satisfactory if it were attempted in a strange room or in a hotel. The most satisfactory coitus they had experienced had been when they performed it in a summer cottage where every noise could be easily heard through the thin partitions. He was given twelve injections of testosterone propionate of 25 mgm. each in a period of two weeks with no changes in potency: At a follow-up interview two and a half years later he reported that his impotence had persisted.

CASE 18.—A 41-year-old married business man complained that he could not obtain an erection when he tried to have intercourse with his wife. Physical examination and laboratory studies revealed essentially negative findings.

The impotence had begun when his wife became enraged at him because he had confessed that he had had an affair with another woman while his wife had been confined to hospital for six months. His wife had interpreted his impotence as proof of her suspicions that he didn't love her and preferred the other woman. A urologist had told him that the impotence was psychogenic in nature, but the patient worried a lot about it. He was given three injections of 25 mgm. each of testosterone propionate. He did not continue the injections because his wife's antagonistic attitude had disappeared and with this his potency had returned. Two months later his wife again became hostile towards him and the impotence recurred. He was given ten more injections of testosterone propionate during a period of four weeks. Two weeks after treatment was discontinued he reported that his potency had once more returned. He attributed this to the improvement in his wife's attitude towards him and to the consequent diminution of emotional tension in himself, and not to the effects of testosterone propionate. Seven months after this it was reported that his potency had remained excellent.

RESULTS AND DISCUSSION.

While we have probably failed to disclose important emotional conflicts in many of our patients, we have observed in some of them that psychic and emotional influences played a large part in the production of the impotence. Thus in patient 18 there was no question but that the impotence was psychogenic in nature. In patient 5 the sexual incapacity appeared to be closely related to the patient's known environmental difficulties. The neurosis and frigidity of his wife undoubtedly influenced the sexual power of patient 6. In patient 9 the lifelong fear and avoidance of sexuality was patently only a manifestation of a severe and deep-seated neurosis. The impotence of patients 10 and 14 was apparently related to their wives' frigidity. Patient 1 was an example of the man who was impotent with his wife but potent with prostitutes. Of patient 12 it might be said that he had marked passivity trends and an interest only in women older than himself. But it is not feasible to attempt to discuss each case in detail from the psychiatric standpoint. The comments just made will serve to indicate the general trend. Careful study of the case histories will reveal the psychiatric factors in the individual patients. It may be added that in some patients we did not succeed in discovering either any specific or clean-cut psychic influences or any definite evidence of organic determinants. In such patients it could not properly be assumed that the impotence was psychogenic unless further investi-

gation uncovered emotional conflicts which stood in an etiological relationship.

Satisfactory relief of the impotence was obtained in seven of eighteen patients (Cases 1, 2, 3, 4, 5, 6 and 7) during the period of the experiment. In ten others (Cases 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17) no improvement at all or minimal effects were noted. In the remaining patient (Case 18) there were no effects from the testosterone propionate but potency returned when emotional stresses were removed.

Potency has remained excellent in six of the seven successfully treated cases since treatment was stopped. In these six cases the lengths of time from cessation of treatment to the date of the follow-up interview were nine, six, six, one, two and seven months, respectively. In the seventh patient (Case 5) impotence recurred when he was subjected to severe environmental difficulties. The ten subjects who were unimproved have noted no change in their impotence since treatment was discontinued.

The definite reduction in the number of spermatozoa noted in one patient (Case 9) during the course of the injections is in keeping with similar observations made elsewhere. One of us⁴⁸ has reported that in a eunuchoid patient, one to two motile sperm per high power field, present on repeated examinations before treatment, disappeared completely to reappear after treatment was stopped. This observation was subsequently repeated on this patient. Heckel⁴⁹ has demonstrated that oligospermia occurred when a 67-year-old man was given 10 to 25 mgm. of testosterone propionate daily and that the number of sperm increased after injections were stopped. Rubinstein and Kurland⁴⁴ concluded that when testosterone propionate is administered to normally constituted adult males in 5 mgm. doses intramuscularly three times a week, there is an increase in the number of spermatozoa. But when 25 mgm. doses were given there was diminution of spermatozoal output with return to normal figures several weeks after therapy was discontinued. McCullagh and McGurl⁵⁰ have observed a similar depression of spermatogenesis when doses of 25 mgm. of testosterone propionate are given three times weekly. This effect should be kept in mind during therapeutic trials with androgens. It is important that such depression of testis function should not be unduly prolonged, until the process of recovery is better understood.

The facts that potency was maintained in the seven successfully treated cases when injections of sesame oil were given, and that there was no decrease in potency when all injections were stopped suggests that the good results cannot be attributed to the effects of the testosterone propionate alone. It seems reasonable to assume that these effects were in large part psychological. This assumption is in keeping with that of Howard and Vest⁴³ in their one reported success, and with the opinion of Rennie, Vest and Howard⁵ that great consideration must be given to the element of suggestion in evaluating the efficacy of any therapy for impotence. It must be remembered, however, that: (a) Zuckerman and Parkes³⁰ noted that sexual interest continued unabated in an immature drill for eighteen months after injections were discontinued; and (b) that Stone²⁸ has reported establishment of sex interest in mature rats, which had previously shown no interest, after testosterone propionate injections, and maintenance of this interest for 2 months after injections were discontinued. It is accordingly not impossible that testosterone propionate may have had effects in our patients enduring beyond the time of treatment, although in conservative interpretation it is safest to regard this as unlikely.

The difficulty in evaluating the effects of testosterone propionate is shown very clearly in the response of Case 4 of our series. During the experiment it appeared that this patient, who had aspermia and small testes, had shown dependency upon the androgens injected. But when he was seen one month after the close of the experiment he reported that he was having satisfactory intercourse twice weekly.

Rennie, Vest and Howard⁵ felt that their impotent patients who responded to testosterone propionate probably suffered from deficiency of internal testicular secretion. They cited in support their experience in the cases of one or two elderly patients. We have already pointed out the difficulty in assessing testicular defect on clinical grounds unless it be severe and long-continued. Assays have not as yet been usefully applied to the problem. While the expectation that those with impotence due to occult testicular insufficiency should respond to androgens is a reasonable one, it must be stated that much success with treatment cannot as yet be attributed solely to the androgen introduced. In our patients it is probable that deficiency in testicular secretion present would have

been made up by the dosage of androgens used as substantial improvement in the physical defects of eunuchoids are accomplished by the dosage used here.

But how may we explain our successful results and the failure of response in the remainder of the patients? Would it be permissible to conclude that improvement or failure is directly correlated with the depth and degree of the neurotic conflicts which may be present? Rennie, Vest and Howard⁵ raised the question whether in individuals with psychogenic impotence an increase in the amount of sexual urge might be produced by hormonal medication, which would thereby increase the confidence of the impotent male to the extent that he might overcome his difficulty. Such an influence may have operated in some of our successes. It is also possible that a neurotic state might be sufficiently severe to inhibit any effects from a substantial physiological stimulation. One of us⁵¹ has observed that testosterone propionate injections so increased the libidinal tension in a male eunuchoid patient who was undergoing psychoanalysis that he developed marked anxiety and avoided heterosexual situations. Benedek and Rubenstein⁵² have noted that neurotic women during psychoanalysis show increased anxiety at certain phases of the menstrual cycle, and do not exhibit adequate heterosexual behavior as normal women usually do at those times. They felt that this could be correlated with the known variations in hormone production.

It is accordingly possible that neurotic conflicts, especially those closely bound to strong sexual interest, may be heightened by such physiological stimulation as testosterone propionate may induce, and that the anxieties and fears so aroused will prevent attainment of the (consciously) desired ends. Our psychiatric studies were not sufficiently intensive to disclose clearly such mechanisms. But it may be inferred from the evidence at our disposal that such may well be true in a number of our patients. On the other hand, testosterone propionate may have had no influence whatever on sexual excitability, as seems to be the case in normal men^{42, 43, 48} and the beneficial results would be interpreted as due entirely to suggestion. In any event, we have in no instance been able to prove strict dependence on added androgens in our cases of impotence. We should not say, however, that such would never be so with more extended experience.

SUMMARY AND CONCLUSIONS.

1. Eighteen men who complained of impotence and who had no obvious disease of the central nervous system, no marked structural changes in the genito-urinary tract except for absence of spermatozoa in Case 4, or no manifest deficiency in the internal secretion of the testes, were given intramuscular injections of testosterone propionate in 25 mgm. doses three times or more weekly.

2. In some of our patients psychic and emotional influences played a large part in the production of the impotence.

3. In seven instances relief from the impotence was obtained, while in the eleven other subjects the testosterone propionate did not produce any beneficial effects.

4. In one patient there was a definite reduction in the number of spermatozoa during the course of treatment.

5. It was concluded that the successful results were probably explained by psychological factors, since there was no decrease in potency when sesame oil was substituted and when all injections were stopped.

6. The amount of androgens administered by us was thought to be sufficient to make up for deficiency in testicular secretion. It is, however, desirable to secure experience with larger amounts of the agent.

7. It is our opinion that the depth and degree of neurotic conflicts present in the individual patient may play an important rôle in determining the nature of the results. We suggest that beneficial effects may be observed in those patients in whom neurotic trends are minimal, and who react to such physiological stimulation as testosterone propionate may induce by enough increase in self-confidence to overcome the impotence. We suggest, furthermore, that failure may be noted in those patients who have severe neuroses, and whose conflicts are so enhanced by the physiological stimulation that the anxieties and fears thus aroused lead to still further inhibition of sexual expression. But it should not be forgotten that testosterone propionate may have had no influence whatsoever on sexual excitability, as seems to be the case in normal men, and such benefit as we have observed may be due only to suggestion.

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DISCUSSION.

DR. H. S. RUBINSTEIN (Baltimore, Md.).—May I open my discussion with a word of congratulation to the authors for their excellent presentation and their comprehensive consideration of the subject, which leaves little room for any additional remarks by a discussor.

One should expect that the treatment of impotence with a single hormonal substance such as testosterone propionate would, because of the very nature of this discussion, be accompanied by many failures. In a review of fifteen consecutive cases of impotence personally studied, no two patients presented the same genetic, dynamic factors. My own feeling in the matter, therefore, is that impotence, like fever, is a symptom and not a disease. As a symptom, it may arise from many diverse disturbances.

If behavior, or more specifically the sex function, represents the integrated result of many lesser part functions simultaneously at work, it becomes at once conceivable how a flaw in any of the many part functions will affect the behavior as a whole, and yet of 18 patients treated by the authors, 7 responded well. Considering the numerous possible causes of impotence, many of which have been enumerated in the early part of this paper, this response to a single hormone is better, I should say, than one could expect. Because of this, one gets the impression that suggestive phenomena have undoubtedly played a part.

On the other hand, one cannot deny the specific effects of testosterone propionate on laboratory animals, in prepuberal boys and eunuchoid adults. The psychic accompaniments observed when this substance is administered to humans must, therefore, not be permitted to sway our judgment concerning its virtues any more than they are allowed to negate the value of any of the other "specifics" of medicine.

It is needless to stress before a psychiatric group the fact that many patients are suggestible. We have long recognized this behavioral tendency; all that remains is that we take it into consideration no matter what method of treatment is employed.

Since testosterone propionate is a well-defined chemical entity with specific and well-defined properties, it is advisable to limit its use in impotence to those patients presenting either out-spoken evidence of structural defect, as for example genital underdevelopment and absence of the testes or other evidence of insufficient and waning testicular function as seen in early senility. When used exclusively in this group in proper dosage testosterone propionate will be found to be not only a stimulator of sex drive but may also serve as a mild tonic.

Proper dosage is stressed because it has been found that this substance, unlike many other hormonal agents, has a dual action. In small doses it stimulates and in large doses it depresses. What constitutes a small or large dose depends upon the patient's condition at the time of examination. If there is marked evidence of testicular insufficiency as, for example, in the hypogonadal adult (described elsewhere—J. A. M. A., 111: 1818, 1938), 25 mg.

given three times weekly may prove to be ideal. In patients with less obvious gonadal defects doses of 5 mg. three times weekly may suffice. In this group fall many of the border-line patients who present symptoms of generalized fatigue or mild anxiety as a result, for example, of business or domestic difficulties. At times, in spite of a feeling of general relief following rest periods or psychotherapeutic discussions in an attempt to alter the individual's reaction to his difficulty, the absence of sex desire lingers on. It is as if the patient has entered into a state of sexual inertia. If it becomes important, as, for example, in those married to alter this state of inertia, it has been found that 5 or 10 mg. several times weekly for about two or three weeks may reestablish the "sex habit."

When doses which are too large for the particular patient are administered, then as pointed out by our laboratory and confirmed by the authors spermatozoal output becomes diminished and the sex urge dwindles. The loss of sex drive in such cases appeared so striking that together with Dr. Walter Freeman and Dr. H. D. Shapiro a study was made concerning the use of large doses of Perandren, *i. e.*, testosterone propionate in nymphomaniacs in which there was obtained a sex calmness unattainable by any of the previously known therapeutic methods.

It is interesting to note the report of "failures" resulting from the administration of androgen considered to be "more than sufficient" for the patient. Here, as previously mentioned, an excess leads to results opposite to those desired. Just why this happens has formed another topic for study and it was considered to be due to the depressing effect that testosterone propionate has upon the anterior lobe of the pituitary gland. Such antagonism leads to a suppression of gonadotropic hormones. In addition it is possible that the sex centers of the hypothalamus may also be depressed by such overdosage.

Finally, the mere fact that sex urge when once stimulated by testosterone propionate is maintained by the further use of sesame oil or with no injections whatsoever, need not indicate that the previous good result was on a suggestive or otherwise psychic basis. It is just possible that hormone therapy was discontinued at a time when the body had reached, let us say, a normal saturation point so that if the hormone had not been discontinued a sex depression due to excessive hormone would have resulted. By discontinuing the hormone at this time, however, two factors may be considered as possibly affecting the future sex behavior: (1) the presence of sufficient blood androgen to maintain the sex urge; (2) the operation of a phenomenon similar to "canalization" of neurophysiology, where patterns of behavior once established tend to maintain themselves if disturbing factors are not marked.

In conclusion, may I emphasize that synthetic chemistry has recently produced so many pure hormonal substances that there is a tendency for some investigators to work rather superficially with many of these products thereby leading more to confusion than to better understanding. For that reason, I reiterate my congratulations to Drs. Carmichael, Kenyon and Noonan on their splendid communication and hope that more such studies may be forthcoming to aid the psychiatrist in his attempt to resurrect his unhappy fellow-man.

PHYSIOLOGICAL AND PHARMACOLOGICAL INVESTIGATIONS ON THE NATURE OF HYPOTHALAMIC EXCITATION.

PRELIMINARY REPORT.*

By ERNST GELLHORN, M. D., PH. D.,

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College of Medicine, Chicago, Ill.*

In view of the importance of the problem of ascertaining the relation between the therapeutic procedures now commonly used in schizophrenia and other mental diseases and the autonomic nervous system (Gellhorn⁷), it seems of interest to report investigations on the effect of anoxia and various drugs upon the hypothalamus. The relation of insulin hypoglycemia to the autonomic nervous system has recently been discussed (Gellhorn⁸) and is therefore omitted.

The experiments discussed in this paper are of interest not only because they establish the fact that anoxia, hypercapnia and convulsant drugs markedly increase the excitability of sympathetic hypothalamic centers, but also because they throw new light on the interrelation between the parasympathetic and the sympathetic nervous system in conditions of central excitation. This seems to be valid for such diversified stimuli as are represented by experiments involving oxygen lack, metrazol convulsions, and the use of electrical stimulation of the hypothalamus calling forth the syndrome of sham rage.

A series of experiments was performed on cats anesthetized with 70 to 100 mgms. per kg. chloralose and an area in the hypothalamus was stimulated by means of the Horsley-Clarke apparatus, from which the contraction of the nictitating membrane (n.m.) was elicited. In several experiments, the cervical sympathetic on the contralateral side was cut and its peripheral end

* Read at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

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was stimulated with induction currents. The contractions of the n.m. were recorded on both sides. This procedure allows one to distinguish between central and peripheral sympathetic effects.

It was found * that inhalation of 4.5 per cent oxygen greatly increased the contraction of the n.m. produced by hypothalamic stimulation, whereas no such effect was noticeable when the contraction of the n.m. was produced by stimulation of the cervical sympathetic. In most instances, the increased hypothalamic activity induced by anoxia, ceased with readmission of air and in some instances a depression of sympathetic activity followed. It is interesting to note that in spite of the conspicuously increased excitability of the hypothalamus, as measured by the increased height of the contraction of the n.m. during anoxia, there were definite signs of a decrease in the intensity of the movements of the limbs which were elicited at the same time during hypothalamic stimulation. The difference in the reaction of autonomic and somatic structures was very marked inasmuch as some of the limb movements disappeared completely under anoxia, while the autonomic reactions increased in intensity.

Results produced by the inhalation of 7.4 per cent carbon dioxide were similar to those described for anoxia. The contraction of the n.m. produced by hypothalamic stimulation was increased during the carbon dioxide period, although to a lesser extent than was observed in experiments on anoxia. No excitatory action of carbon dioxide could be found with regard to the peripheral structure (n.m.). The somatic movements produced by the hypothalamic stimulation did not show any alteration in threshold during hypercapnia.

A number of convulsant drugs were also used and it was found that metrazol (0.2 to 0.8 cc. 10 per cent per cat) when given intravenously, markedly increased the hypothalamic excitability as measured by the contraction of the n.m. In contradistinction to the results obtained in experiments on anoxia and hypercapnia, the metrazol effect persisted over long periods of time, although the convulsions lasted only a fraction of a minute or a few minutes. A slight excitatory effect was noticeable on the peripheral structures also, but at a time when the hypothalamic excitability

* Experiments performed in collaboration with H. B. Carlson.

was still much increased as seen by the increased contraction of the n.m., the peripheral response no longer indicated any change in excitability. It was possible to show that intravenous injections of coramine, coriamyrtin and picrotoxin produced similar but definitely weaker effects than those obtained with metrazol. The marked sympathetic discharges occurring spontaneously or on reflex stimulation in cats on intravenous injection of metrazol (Gellhorn and Darrow⁹), seem to be due to an increased excitability of autonomic centers including the hypothalamus.*

These experiments show clearly that anoxia as well as metrazol and other convulsant drugs, increase the excitability of the hypothalamus thereby leading to increased sympathetic discharges. They give thereby additional support to the theory that the therapeutic effect of metrazol (and possibly that of anoxia) is due to its excitatory effect on sympathetic centers (Gellhorn⁷).

Since it is well known that stimulation of the anterior and tuberal parts of the hypothalamus may lead to parasympathetic responses, (Ranson¹³ and collaborators, Beattie² and Beattie and Sheehan⁸) and since Masserman¹¹ claims to have obtained excitation of the gastrointestinal tract from all parts of the hypothalamic area provided that weak stimuli were used, it seems of importance to investigate whether the stimulation of the hypothalamus by oxygen lack or metrazol, leading to such marked signs of sympathetic excitation, is due to a specific action of these factors on hypothalamic sympathetic centers or involves parasympathetic centers or pathways as well. It seems quite possible that simultaneous parasympathetic and sympathetic excitation may lead to the outward signs of sympathetic excitation on account of the greater strength of the sympathetic innervation. It was thought that a decision between these two possibilities may be obtained by suppressing the sympathetico-adrenal mechanism and studying the effects of anoxia and metrazol under these conditions. The experiments were carried out on rats and showed that, whereas anoxia regularly produces a rise in blood sugar in normal rats, it

* Masserman¹⁰ did not succeed in establishing this relationship since he failed to observe any alteration of hypothalamic excitability on intravenous injection of metrazol. His finding that intrahypothalamic injection of metrazol stimulated the injected area is hardly of physiological or pharmacological significance.

leads to a distinct hypoglycemia when carried out on adrenalectomized animals.* The experiments confirm observations of McQuarrie¹² and collaborators on dogs. This effect seems to indicate that anoxia stimulates not only the sympathetico-adrenal system, but also, at the same time, the vagus leading to increased insulin secretion. If this interpretation is correct, it was to be expected that the division of the vagi below the diaphragm would eliminate this effect. The experiments showed indeed that adrenalectomized rats in which the vagi were divided below the diaphragm, no longer showed a hypoglycemia when exposed to anoxia, but reacted when compared to the reaction observed in control animals with a slight and delayed rise of the blood sugar. This latter rise is probably due to the effects of sympathin.

Similar experiments were performed on rats with metrazol. The results were quite similar to those described for anoxia. Here again it was found* that, whereas normal rats react to metrazol with a hyperglycemia, a fall in blood sugar results from metrazol after the adrenals have been removed. This hypoglycemic reaction occurs only when the vagi are intact, since vagotomized and adrenalectomized rats show a slight delayed rise in blood sugar (due to sympathin?) when treated with metrazol.

The experiments show conclusively that anoxia and metrazol lead to the simultaneous excitation of the parasympathetic and the sympathetic system. The effects on the parasympathetic system are, however, masked under ordinary conditions by the predominance of sympathetic innervations.

It is important to learn whether the reaction of autonomic centers to anoxia and metrazol is similar to the reaction of these centers when stimulated by emotional activity. Cannon,⁶ Bard¹ and others have emphasized the predominant part played by sympathetic discharges in the emotional processes and the rôle of the hypothalamus. It seemed not improbable that in spite of this predominance of sympathetic discharges under conditions of emotion, parasympathetic excitation would take place at the same time but its effects might be obscured by the more powerful sympathetic impulses which innervate the same organs at the same time. In order to decide this question experiments were

* Experiments performed in collaboration with R. Cortell and J. Feldman.

performed on cats in which the hypothalamus (particularly the mammillary bodies) were stimulated with faradic currents by means of the Horsley-Clarke apparatus. The hypothalamic centers were stimulated three times in intervals of one minute for five seconds. Typical sympathetic responses were elicited corresponding to a mild or strong rage reaction. The pupils dilated, erection of the hairs occurred, respiration was markedly increased, and arching of the back and unsheathing of the claws were observed. In one group of animals, the adrenals were removed and the liver denervated. In another group, the spinal cord was sectioned at the lower cervical level 18 hours prior to the experiments, in order to eliminate sympathetico-adrenal effects. In each experiment two sets of stimulation of the hypothalamus were performed, one before and the other after double vagotomy. It was found not infrequently, that when the vagi were intact hypothalamic stimulation led in these animals to a temporary hypoglycemia, whereas after sectioning of the vagi, the blood sugar rose. In other animals, the hypoglycemic phase after the first stimulation period was not marked, but a comparison of the results produced by the first and second stimulation period, showed clearly that stimulation after the elimination of the vagi produced a greater rise in blood sugar (due to sympathin?), than could be obtained in conditions in which vagal impulses were allowed to reach the pancreas and increase the secretion of insulin. We therefore come to the conclusion that anoxia, metrazol and sham rage induced by electrical stimulation of the hypothalamus, lead to an excitation of both divisions of the autonomic nervous system. The excitation of the vagus causes an increased insulin secretion, the stimulation of the sympathetic system an increased secretion of adrenalin in the intact animal. The latter is so predominant that it completely obscures the equally important effects on the vago-insulin system. But the elimination of adrenalin secretion by denervation of the adrenal glands, their removal or by sectioning of the spinal cord in the lower cervical region, creates conditions in which the excitation of the vago-insulin system by means of anoxia, metrazol and hypothalamic excitation can be demonstrated. This interpretation is supported not only by Britton's⁴ observation that vagal stimulation may lead to secretion of insulin, but also by a direct assay of the blood for insulin. Brugsch⁵ had found that the

mouse may be used as a test animal for insulin when injected with blood intraperitoneally. We used this method but employed an adrenalectomized mouse instead of a normal animal, since adrenalectomy greatly sensitizes to insulin. In a series of experiments blood from adrenalectomized rats was injected into adrenalectomized mice and the blood sugar of the mouse determined after an interval of two hours. Another series of adrenalectomized mice was injected with blood obtained from adrenalectomized rats subjected to either anoxia or metrazol. It was found that, as measured by the mouse test, this blood contained more insulin than was found in the blood of adrenalectomized rats prior to the experiment. Finally, it was shown that adrenalectomized, vagotomized rats failed to show an increased insulin content of the blood when tested by the mouse method.

It may therefore be concluded from these experiments that anoxia, metrazol and sham rage induced by faradic stimulation of the hypothalamus, lead to a simultaneous excitation of the vago-insulin and sympathetico-adrenal system. But these experiments do not prove as yet whether this same mechanism is called into action during the physiological emotional process. To decide this final question, experiments were performed on cats in which, on account of sectioning of the spinal cord at the lower cervical level, the sympathetico-adrenal system could not be excited from diencephalic and medullary centers. These animals were excited by a barking dog, and the blood sugar was determined before and after the period of the excitement. It was found that rage caused a fall in blood sugar in these animals. This hypoglycemic effect is due to impulses reaching the pancreas via the vagi, as proven by the fact that sectioning of the vagi below the diaphragm abolished this effect.

The experiments prove that the emotional process is accompanied by both vagal and sympathetic excitation. The former leads to increased secretion of insulin, the latter enhances the secretion of adrenalin.

SUMMARY.

1. Experiments are briefly cited in which in narcotized cats, the hypothalamus was stimulated and the contraction of the nictitating membrane on the same side recorded. In addition to this

the cephalad end of the cervical sympathetic was stimulated on the contralateral side, and the contractions of the corresponding nictitating membrane were recorded also. This preparation allows one to distinguish between central and peripheral effects. It was shown that anoxia, inhalation of excess carbon dioxide and various convulsant drugs, such as metrazol, coramine, picrotoxin and coriamyrtin, increase the excitability of sympathetic hypothalamic centers on intravenous injection. The most effective drug is metrazol, which may produce signs of increased sympathetic discharges as measured by the height of the contraction of the nictitating membrane for long periods of time.

2. The effects of anoxia and of metrazol convulsions were investigated on normal rats and animals in which the adrenals had been removed. Furthermore, rats were used in which, in addition to the removal of the adrenals, the vagi had been divided below the diaphragm. It was found that anoxia and metrazol, while producing a hyperglycemia in the normal animal, lower the blood sugar level in the adrenalectomized rat. If, however, the vagi are divided in adrenalectomized animals, anoxia and metrazol no longer produce a hypoglycemia, but call forth merely a slight and delayed rise in blood sugar. The experiments are interpreted to mean that anoxia and metrazol produce a simultaneous excitation of the sympathetico-adrenal and vago-insulin system in the normal animal, but that the excitation of the latter does not become apparent on account of the predominance of the sympathetico-adrenal system.

3. It is shown that electrical excitation of the hypothalamus leading to a typical rage response produces a rise in the blood sugar in the normal, but a fall in blood sugar in animals with adrenals eliminated and liver denervated. If, however, the vagi are cut, the hypoglycemic effect disappears and a delayed slight hyperglycemia (due to sympathin?) occurs. It is inferred that the process of sham rage is characterized by a simultaneous discharge over both divisions of the autonomic nervous system.

4. If cats in which the spinal cord had been divided at the sixth cervical segment, in order to eliminate excitation of the sympathetico-adrenal system, are exposed to a barking dog they react with reversible hypoglycemia. This reaction is absent when the vagi are cut below the diaphragm. It is inferred that emotion

involves both vagal and sympathetic excitation. The former leads to increased secretion of insulin, the latter enhances the secretion of adrenalin.

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DISCUSSION.

DR. JULES H. MASSERMAN (University of Chicago).—I was particularly pleased to hear that Dr. Gellhorn's recent research confirms certain conclusions that I had already published—namely, that metrazol, whether injected intravenously or directly into the hypothalamus, increases both the ortho-sympathetic and para-sympathetic responses that may be obtained either alone or in combination from the hypothalamus by the use of differential strengths of current. But I am afraid that neither on neurophysiologic nor psychiatric

grounds can I follow Dr. Gellhorn in his direct application of these animal experimental findings to his theory of emotion in man. As Dr. Gellhorn and others have shown, electrical or pharmacological stimulation of the hypothalamus in animals undoubtedly produces sympathetic hyperactivity accompanied by behavior *resembling* that in emotional excitement; however, there is really no proof that such stimulation actually produces any true affective experience as such in the animal. In fact, the following evidence indicates that affective states are *not* induced by artificial sympathetic stimulation: (1) The "sham rage" (Bard's more careful and accurate term) induced by hypothalamic stimulation is mechanical, stereotyped and ceases promptly with the end of the stimulus,—which is certainly not characteristic of an emotional state. (2) Animals may recover from extensive hypothalamic lesions and yet show almost normal affective responses to emotionally meaningful situations. (3) By means of certain conditioning experiments which I am at present demonstrating in a motion picture film elsewhere at this meeting, it can be shown that the animal cannot learn to adapt to the behavior induced by a direct stimulus to the hypothalamus, probably primarily because such behavior has no meaning for the animal, *i. e.*, is devoid of emotional connotation. (4) Finally, evidence is lacking that any such direct correlation between vegetative activity and emotion exists in the human. One may remember in this connection work such as that of Marañón, who showed that sympathomimetic drugs do not induce affect but only intensify an emotion when it is already present; or that of Sherrington, who observed normal emotions even when the sympathetic connections were obliterated by high cervical transection of the spinal cord. Alpers, in a recent study, has summarized the evidence of the rôle of the human hypothalamus itself in emotion, and concluded essentially as follows: "It would seem from the assemblage of facts . . . that the hypothalamus is now urged as the seat of the emotions, intellect and personality. No such conclusions are possible . . . (although) . . . the hypothalamus may be regarded as an area concerned with the expression of emotional *reactions* (*italics mine*). . . . I know very definitely emotions as such cannot be represented in the hypothalamus."

Therefore, while I wish to reiterate my admiration for Dr. Gellhorn's invaluable neurophysiologic and neuropharmacologic contributions, I would plead that we do not make an as yet unwarranted application of them to the much more complex problems of clinical psychiatry.

DAVID McK. RIOCH (St. Louis, Mo.).—I think Dr. Gellhorn's work and Dr. Masserman's work have demonstrated that we have in the posterior part of the hypothalamus certain parasympathetic centers. I think it is definite that centers controlling the parasympathetic system are more important in the cortex and in the olfactory brain than they are in the hypothalamus.

The problem of localization of rage or the "sham rage" reaction to the hypothalamus is not yet settled. Nobody has yet removed the hypothalamus and left the region just lateral to it intact and seen whether or not a sham rage reaction could be obtained. All of the transections have been complete

transections. A great deal of tissue remains intact beside the hypothalamus, including the nucleus hypothalamicus, the fields of Forel and other parts of the subthalamus. The fact that a picture of behavior closely resembling "sham rage" can be elicited by stimulation of a small area in the posterior hypothalamus is fair evidence that the posterior hypothalamus is one of the important centers for organizing the expression of sham rage. Of course, when I discuss sham rage, it has nothing to do with the affective and other aspects of emotions.

I think it is fairly certain that a number of types of behavior that we consider emotional are not located in the hypothalamus at all. Estral behavior in the female guinea pig and in the female cat are determined definitely above the hypothalamus. The fighting reaction in the cat can be elicited by electrical stimulation from a rather isolated area well lateral to the hypothalamus. The expression of pleasure by purring in the decorticated preparation and some other types of pseudo-affective response are probably not involved in the hypothalamus to any great extent, other than that certain sympathetic fibers run through the hypothalamus.

The idea that the posterior hypothalamus is the sympathetic center also has to be modified. It is certain that by stimulating the posterior hypothalamus one gets a stronger sympathetic response than by stimulating possibly any other single region in the brain. However, by stimulating lateral to that region one gets many sympathetic responses and the pathways leading from the hypothalamus and from the subthalamus down are scattered and apparently have various origins. Therefore the hypothalamus must be regarded objectively and not as the mystical emotional center.

Another thing I wanted to mention was the relationship of the hypothalamus to the frontal lobes. I think this probably has an importance in trying to work out the relationship of the hypothalamus to emotions. I collaborated with Dr. Robert S. Morrison at the department of physiology in Harvard in some work on the reflex responses of the nictitating membrane to electrical stimulation of the sciatic nerve under urethane anesthesia. We found two things: With the intact animal, there was a marked inhibition of the response during stimulation with tremendous rebound following stimulation, but if the frontal lobes were removed the inhibition was reduced and the rebound was reduced. The effect of the reflex was much stronger from the very beginning. More striking than that, however, was the observation that with the frontal lobes intact, the after-discharge of the reflex might last two or three minutes. With the frontal lobes removed the after-discharge was tremendously reduced; that is exactly the same picture that one gets with the expression of rage in the normal animal and the expression of rage in the decorticated animal. The normal animal will continue to show rage reactions for two or three hours; whereas with the decorticated cat the rage response is over within about 5 seconds after stimulation is removed, and two or three minutes after the stimulus one can show no further change in the behavior of the animal.

ERNST GELLHORN (closing discussion).—Both discussants have talked about the "sham rage" and its relation to emotion. Due to the shortness of

time, I was unable to elaborate sufficiently on our last group of experiments but I would like to emphasize at this time that we have done experiments not only in animals with "*sham* rage" but in cats subjected to rage reaction when confronted with a barking dog. The effect of rage and of "*sham* rage" is the same on the autonomic centers calling forth an excitation of the vago-insulin plus the sympathetico-adrenal system. In the absence of the sympathetico-adrenal system the vago-insulin effects predominate on the blood sugar. Everybody is familiar with the fact that strong emotions may lead to an evacuation of the bladder and rectum. Cannon himself comments on this fact in 1929 and makes the statement that this is due to the breakdown of reciprocal innervation of the autonomic nervous system. I believe this to be erroneous. Reciprocal innervation is present in spinal reflexes but there are many exceptions to the reciprocity principle in central mechanisms. Emotion may cause increased secretion of the gastric juice and increased heart rate, indicating excitation of both branches of the autonomic system.

ANALYSIS OF SEX OFFENSES AMONG MALE PSYCHIATRIC PATIENTS.*

By SAMUEL H. RUSKIN, M. D.,

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The increasing interest of the general public in the grave problem of sex delinquency, particularly among persons with a history of commitment to a mental hospital, led to a survey of male psychiatric patients at Eloise Hospital to determine the incidence of and the inter-relationship of sex delinquency and mental disease, and to determine this sex deviation before and after the onset of the psychotic symptoms.

A survey of the records of the 1,932 male patients in Eloise Hospital on February 15, 1940, revealed 130 or 6.7 per cent sex offenders. Of these 123 were white and 7 negro. Although there were 200 negro patients in the hospital at the time of the survey, due to the fact that there were no essential differences in the history of the negro as compared to the white patients, colored and white patients will be considered as a single group for the purposes of convenience.

In all probability the percentage of sex offenders among psychotic patients is greater than is here represented. Because: (1) In Michigan at least, a large portion of sex cases are committed to special institutions for the criminally insane or to prisons rather than to mental hospitals, hence the patients in Eloise Hospital actually represent a select group from which a considerable portion of sex offenders have been removed; (2) Due to lack of anamnestic data some cases may have had a sex history without its being recorded. However, even considering these factors and despite the restrictions placed on the study by the limited size of the group under consideration, certain general pertinent observations may be made.

In the study as to whether the sex delinquency occurred before or after the onset of symptoms, if after a careful study of the

*Read at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

case there was doubt the patient was classified as showing delinquency after the onset of psychosis. The term "onset of the psychosis," however, does not indicate commitment or hospitalization but refers to the first serious changes in behavior noted by the informant. This study showed 116 or 89.2 per cent had committed sexual offenses after the onset of the psychosis, while 14 or 10.8 per cent committed sexual offenses before the recognizable onset of the psychosis, which indicates that 10.8 per cent were already criminal problems before becoming psychiatric problems.

TABLE I.

SHOWING THE DISTRIBUTION OF THE AGE GROUPS OF 130 SEX DELINQUENTS IN ELOISE HOSPITAL ON FEBRUARY 15, 1940.

Also of 3210 Male Patients Admitted to Eloise Hospital from January, 1935, to February 15, 1940.

| Age. | Sex delinquents. | | General hospital population. | |
|-------------------|------------------|-------------|------------------------------|-------------|
| | No. | Percentage. | No. | Percentage. |
| Less than 10..... | 1 | 0.8 | 5 | 0.2 |
| 11-20..... | 11 | 8.5 | 153 | 4.8 |
| 21-30..... | 31 | 24.0 | 615 | 19.2 |
| 31-40..... | 35 | 27.0 | 873 | 27.2 |
| 41-50..... | 23 | 18.0 | 758 | 23.6 |
| 51-60..... | 12 | 9.0 | 426 | 13.3 |
| 61-70..... | 12 | 9.0 | 211 | 6.5 |
| 71-up..... | 5 | 3.7 | 169 | 5.2 |
| Totals | 130 | 100 | 3,210 | 100 |

The preponderance of sexual delinquency occurring after onset of the psychosis may be in part attributed to the fact that obviously psychotic patients would be committed to a mental hospital. Cases where psychotic symptomatology was lacking would incline the court to sentence the patient to prison, thereby removing him from hospital statistics. This suggests that there is a definite relationship between sex deviations and mental disorder.

For the purpose of making comparisons of the 130 sex offenders a number of statistical studies were made. Patients were first divided into age groups, the range of the entire group being from seven to ninety-four years of age at the time of admission to the hospital. The largest age group fell between 21 and 50 years of

age. There was a definite rise in the third, fourth and fifth decades, which was particularly marked in the fourth. A control tabulation made of 3210 consecutive admissions of male psychiatric patients to this hospital up to February 14, 1940, was in keeping with these findings, showing that the highest admission rate was in the third, fourth and fifth decades, with the peak being reached in the fourth, thus showing that delinquency was not related to any particular group but was probably a characteristic of the psychosis.

In comparing the marital status of the group it was noted that there was a strong preponderance of single men, or specifically 88 patients, amounting to 67.8 per cent of the total cases considered. Married men accounted for 20 or 15.4 per cent of the group, divorced men accounted for 12 or 9.2 per cent, and widowers for 10 or 7.7 per cent. Despite the fact that the size of the group precludes definite conclusions a number of inferences seem justified. It would appear that single men are more prone to commit sex offenses, or that basic personality difficulties caused them to remain single and to commit delinquencies, or both. Basic personality difficulties may be reasonably assumed to have been the root of the unsuccessful marital adjustments of the divorced group. This is also indicated by the fact that tabulation of the marital adjustments of the married men showed them to be definitely bad in every case. Less significance can be attached to the findings obtained from the group of widowers since the majority of these fell into the older age groups where the incidence of senility was greatest. A comparison of these figures with 3210 male psychiatric patients shows the single men to be 47.4 per cent, as compared to 67.7 per cent, the married men to be 40.7 per cent as compared to 15.4 per cent. No perceptible difference can be noted in the divorced and widowers. Thus showing that sex delinquency is more common in single than in married psychotic patients.

Another significant factor in this investigation was the fact that disrupted homes during youth were found to form part of the history of the majority of the patients. In classifying the home status for tabulation purposes, a home was considered disrupted if during the youth of the patient, both parents were dead, or where one parent was dead and the other was unable to adequately care for the patient due to poor economic circumstances, or if after

the death of one of the parents, the other remarried and there was difficulty in making adjustment with the step-parent. The home was also considered disrupted or unstable if the parents of the patient were divorced before he reached the age of eighteen. Homes were also classified as unstable where both parents, though alive, showed alcoholism or some psychopathy leading to insecurity in the home.

The findings in this study showed that 50 or 38.5 per cent of the group came from intact homes. Although this is the largest single group in the four classifications certain factors must be taken into account before making any definite conclusions. For the purpose of study it was felt justifiable to work with the last three classifications as a single group: (1) In those cases whose home status was unknown, it was considered probable, in a certain percentage of the group at least, that the lack of interest evidenced by relatives might indicate, if not a disrupted home, at least one that was more or less unstable; (2) the intact, but unstable home, may show more insecurity and less stable environment than the disrupted home. Therefore, despite the fact that the largest single group came from homes that were intact, the assumption seems warranted, if the underlying significances of the other three groups are considered, that the majority of the sexual delinquents in this series came from homes whose environment was poor and unstable.

In tabulating the history of psychopathic tainting, direct or collateral of the patients under study, a history of psychosis in one or more members, or an addiction, such as alcohol or drugs, in two or more members was considered as tainting.

The findings showed that of the 130 cases considered 58 or 44.6 per cent gave no history of psychopathy in direct or collateral members of the family. A history of psychopathy appeared in most of the remainder of the groups, but to varying degrees. A history of slight psychopathy, such as only one psychotic or two addicted collaterals, was shown by 43 or 33.2 per cent of the group. Ten cases showed a larger amount of psychopathy in which two to four direct or collateral members were affected, while only two cases had histories of four to six members of the family with psychopathic traits. No cases went further than this. Due to lack of information 17 or 13.1 per cent had to be classified as unknown.

However, it was considered that a certain percentage, if not all of the group, probably had some members of the family with psychopathic traits due to the fact that lack of interest by relatives is suggestive of deficiencies in the family.

Even with the addition of this group of unknowns to those showing history of tainting, a percentage of 55.4 per cent tainted patients is obtained as compared with 44.6 per cent having no tainting. This would indicate that sex delinquency among those patients where there is a history of psychopathy in the family is but little, if any, greater than in those where no such history was obtained. The size of the group, however, precludes definite conclusions.

In a study of the relationship between the various types of psychosis manifested by patients and the different types of sex deviation, the group was divided into six diagnostic classifications.

In view of the smallness of the group and the similarity of certain types of psychoses, several types were placed in one diagnostic group. Paranoid conditions were included with the schizophrenic group; in the organic psychoses were included alcoholics, general paretics, epileptics and those suffering from psychosis with brain and other nervous diseases, because it was felt that probably the same general type of pathology was found in all cases with the exception of the epileptics. The schizophrenic group formed the largest single group, there being 57 or 43.8 per cent. Organic psychoses accounted for 30 or 23 per cent of the cases. The senile and arteriosclerotic were considered in a group by themselves due to the general tendency of showing different organic changes in the brain than the group previously mentioned. These numbered 14 or 10.8 per cent. Mental deficiency with psychosis numbered 11 or 8.5 per cent. Psychopathic personality with psychosis numbered 11 or 8.5 per cent and manic-depressive psychosis formed the smallest group, there being 7 or 5.4 per cent. These figures when considered and discounted for the smallness of the groups showed no marked variation from the figures found in the tabulation of the general hospital male population, and would indicate that the type of psychosis has no particular bearing upon sex delinquency in general.

The type of sex delinquency committed by the group under study was divided into ten categories. If a patient had a history of one

or more delinquencies he was first arbitrarily classified according to the more socially reprehensible offenses and then under the remaining offenses.

Data shows that the exhibitionists, of whom there were 39 or 22 per cent, the pedophiliacs, amounting to 34 or 19.3 per cent, the homosexuals, numbering 24 or 14.2 per cent of the group formed the largest percentage of the entire series. Those committed for molesting women numbered 16 or 9.1 per cent. Following this in size were rape, incest and physical assault, of which there were 12, 11 and 10 cases respectively. Nine or 5.1 per cent of the group were voyeurists; bestiality accounted to 7 or 4 per cent; the miscellaneous classification, in which were included those deviations of least incidence in this particular series, such as fetishism and self-mutilation, numbered 13 or 7.3 per cent of the group. In correlating the type of sex crime with the type of psychosis each diagnostic classification was considered individually. The schizophrenic group being the largest was considered first.

The schizophrenic it is interesting to note formed 43.8 per cent of the group of 130 patients and also committed 43.7 per cent of all the delinquencies. However, they showed some predominance toward certain types of offenses. Thus they committed 54.3 per cent of the homosexual offenses; comprised 62.5 per cent of the group molesting women, committed 70 per cent of the miscellaneous offenses, 60 per cent of assault cases; however, only committed 9 per cent of rape offenses. The other offenses committed by the group showed no unusual disproportion to the number of schizophrenics in the total group. Fifty-two per cent of all delinquencies committed by schizophrenics were exhibitionism, pedophilia and homosexuality which are infantile forms of sexuality. This may be explained by the fact that schizophrenics are undeveloped and immature personalities and their sex histories give weight to the idea that as a group they never mature sexually. This is especially true of the male schizophrenic.

The organic psychotic formed 23 per cent of the total number of patients and committed 24.5 per cent of the delinquencies. Exhibitionism and pedophilia were the most common offenses committed by this group, but were not out of proportion to the number of patients suffering from organic psychosis in the total group.

However, this group did show some preponderance in certain types of delinquencies. They committed 41 per cent of the rape offenses, 71 per cent of the bestialities and comprised 44.4 per cent of the voyeuristic group. The other offenses committed were much below the group average. The organic psychotic showed the most common type of offenses to be an infantile type of regression; that is, they committed exhibitionism, pedophilia and homosexuality. They accounted for the majority, namely 71 per cent, of the bestiality cases and approximately half, or 41 per cent of the rape cases, both of which are offenses of violence

TABLE II.

TYPES OF SEX DELINQUENCIES BY PATIENTS SUFFERING FROM ORGANIC PSYCHOSES IN ELOISE HOSPITAL AND UNDER STUDY ON FEBRUARY 15, 1940.

| Type. | No. | Percentage of group. | Percentage of all such delinquencies. |
|------------------------|-----|----------------------|---------------------------------------|
| Exhibitionism | 9 | 20.9 | 23.1 |
| Pedophilia | 8 | 18.6 | 23.5 |
| Homosexuality | 6 | 13.9 | 27.5 |
| Rape | 5 | 11.4 | 41.4 |
| Bestiality | 5 | 11.4 | 71.4 |
| Voyeurism | 4 | 9.3 | 44.4 |
| Incest | 3 | 7.0 | 27.3 |
| Molesting women | 1 | 2.5 | 6.2 |
| Physical assault | 1 | 2.5 | 10.0 |
| Miscellaneous | 1 | 2.5 | 7.7 |
| Totals | 13 | 100 | |

and distortion. This is in keeping with the manifestations of the psychotics suffering organic brain disease who are violent and more distorted in their actions than patients suffering from other types of psychoses.

The senile and arteriosclerotic group comprised 10.8 per cent of the entire series of cases and committed approximately 9 per cent of all the delinquencies. Thus it was found that although if compared with the rest of the group the exhibitionism and pedophilia cases are well within the average, due probably to the fact that only 10.8 per cent of the total cases were senile or arteriosclerotic, yet within their own classification, 60 per cent of the

offenses committed by this group were exhibitionism or pedophilia. The relationship between this type of mental disease and the regressive behavior accompanying it accounts for this high incidence and the social seriousness of the fact should not be over-

TABLE III.

TYPES OF SEX DELINQUENCIES COMMITTED BY THE GROUP OF SENILE AND ARTERIOSCLEROTIC PATIENTS UNDER STUDY AND AT ELOISE HOSPITAL ON FEBRUARY 15, 1940.

| Type. | No. | Group percentage. | Percentage of all such delinquencies. |
|---------------------|-----|-------------------|---------------------------------------|
| Exhibitionism | 5 | 33.3 | 12.8 |
| Pedophilia | 4 | 26.7 | 11.8 |
| Assault | 2 | 13.3 | 20.0 |
| Rape | 2 | 13.3 | 16.7 |
| Incest | 1 | 6.1 | 9.0 |
| Miscellaneous | 1 | 6.7 | 7.1 |
| Totals | 15 | 100 | |

TABLE IV.

TYPES OF SEX DELINQUENCY COMMITTED BY THE MENTALLY DEFICIENT GROUP UNDER STUDY AND AT ELOISE HOSPITAL ON FEBRUARY 15, 1940.

| Type. | No. | Group percentage. | Percentage of all such delinquencies. |
|-----------------------|-----|-------------------|---------------------------------------|
| Exhibitionism | 3 | 21.3 | 7.7 |
| Molesting women | 3 | 21.3 | 18.8 |
| Homosexuality | 2 | 14.3 | 8.3 |
| Rape | 1 | 7.2 | 8.3 |
| Incest | 1 | 7.2 | 9.0 |
| Pedophilia | 1 | 7.2 | 2.9 |
| Voyeurism | 1 | 7.2 | 9.9 |
| Miscellaneous | 2 | 14.3 | 15.4 |
| Totals | 14 | 100 | |

looked. This is probably due to the regressive phenomena of the psychosis in which they become infantile and immature.

Mentally deficient patients comprised 8.5 per cent of the entire group and participated in all but three of the delinquencies listed. They showed no marked change in the percentage of offenses committed, except in the molesting of women and homosexuality, where

there was a slight increase, but this was not marked. This would indicate that mental deficiency in itself does not show lack of sexual development, but shows crudity and lack of judgment in sex matters.

TABLE V.

TYPES OF SEX DELINQUENCY COMMITTED BY THE PSYCHOPATHIC
PERSONALITY GROUP UNDER STUDY AND IN ELOISE
HOSPITAL FEBRUARY 15, 1940.

| Type. | No. | Group percentage. | Percentage of all such delinquencies. |
|-----------------------|-----|----------------------|---|
| Pedophilia | 7 | 41.2 | 20.3 |
| Exhibitionism | 4 | 23.5 | 10.3 |
| Rape | 3 | 17.7 | 25.0 |
| Molesting women | 2 | 11.7 | 12.0 |
| Homosexuality | 1 | 5.9 | 4.4 |
| Totals | 17 | 100 | 72.0 |

TABLE VI.

TYPES OF SEX DELINQUENCY COMMITTED BY THE MANIC-DEPRESSIVE
PSYCHOSIS GROUP UNDER STUDY AND IN ELOISE
HOSPITAL FEBRUARY 15, 1940.

| Type. | No. | Group percentage. | Percentage of all such delinquencies. |
|---------------------|-----|----------------------|---|
| Exhibitionism | 3 | 33.4 | 7.7 |
| Pedophilia | 2 | 22.2 | 5.9 |
| Incest | 2 | 22.2 | 18.0 |
| Homosexuality | 2 | 22.2 | 9.2 |
| Totals | 9 | 100 | 40.8 |

The psychopathic personalities committed approximately 8.5 per cent of the sex offenses and comprised 8.5 per cent of the patients under study. However, they accounted for 20.3 per cent of the occurrence of pedophilia and 25 per cent of the rapes. Three other types of sex offenses committed by this group bore approximately the same percentage rating as the standing of this group in the series of cases. The psychopath while he has no lack of sexual development shows lack of control and lacks the faculty of learning from experience.

The manic-depressive group was the smallest, being only 5.4 per cent. They committed nine offenses which were fairly evenly distributed between exhibitionism, pedophilia, incest and homosexuality.

A study of felonies and misdemeanors showed that there were 26 patients in the group under consideration known to have committed other misdemeanors besides those of a sexual nature. Several of the patients committed a number of misdemeanors. Not all of the patients who were arrested for misdemeanors were given prison terms; only eleven of the twenty-six were sentenced. In the remaining fifteen the court recognized that the patients were psychotic and commitment to the hospital followed. Seven of the thirteen patients were sentenced to prison for sex offenses, but following their release from prison were committed to the hospital, indicating that in those cases where the psychosis was not recognized prior to the sentence it was recognized while the patient was in prison. This is highly suggestive of a more hopeful and enlightened attitude on the part of the officers of the law, indicating that the machinery of justice recognizes psychosis at one stage if not at another.

Six of the group committed felonies and were given prison terms for these felonies. Three of this group were classified as psychopathic personalities, one of whom committed two felonies.

SUMMARY.

1. Of 1,932 mental patients who formed the male population of Eloise Hospital on February 15, 1940, 130 or 6.7 per cent were found to be sex delinquents.
2. Fourteen or 10.8 per cent of the group of 130 patients were actual sex offenders before the recognizable onset of their psychosis.
3. One hundred and sixteen, or 89.2 per cent, gave a history of sexual deviation after the recognized onset of their psychosis. Some of the credit for this preponderance could be accorded to the fact that mental hospitals would contain more patients showing psychotic symptomatology than those whose lack of such manifestations would lead to prison sentences rather than commitment to a mental institution.
4. In an age range from 7 to 94 years at the time of admission to the hospital, the majority of patients came from the third and

fourth decades, with the peak being reached in the fourth and fifth decade, which is in keeping with the general male admission rate.

5. Sixty-seven per cent of the offenders were single, 15 per cent married and the remainder were divorced or widowers at the time of hospitalization.

6. 38.5 per cent of the patients came from intact homes. However, the combination of intact, but unstable homes, disrupted homes, and those cases where the home status was unknown, suggested that the majority of the patients had poor home environment.

7. There were 44.6 per cent untainted patients as compared with 54.4 per cent who gave evidence of tainting, which seemed to indicate that tainting had little bearing upon the incidence of sex delinquency.

8. The percentage of the type of psychotic committing offenses was compared to the percentage of these groups in the general hospital population, showing that sex delinquency is apparently a function of psychosis in general and not of any type in particular.

9. Certain types of psychotics showed predominance toward certain types of delinquencies.

A. The schizophrenic group showed predominance toward homosexuality, molesting of women and physical assault.

B. The organic psychotic group showed a predominance toward rape and voyeurism and a very strong predominance to bestiality, actually committing 71.4 per cent of these offenses while this group formed only 23 per cent of the cases studied.

C. Seniles and arteriosclerotics showed an increased tendency toward committing such offenses as exhibitionism and pedophilia, these two comprising 60 per cent of the total offenses committed by this group.

D. Mentally deficient patients, comprised 8.5 per cent of the total group, tended toward homosexuality and to a slight degree to the molesting of women.

E. Psychopathic personalities, although forming only 8.5 per cent of the entire group, committed 20.2 per cent of the pedophilias and 25 per cent of the rapes.

F. Manic-depressive psychotics showed no particular predominance in any one type.

10. Twenty-six patients committed misdemeanors in addition to those of a sexual nature. Eleven served prison terms prior to hospitalization whereas fifteen were directly hospitalized as psychotic. Six of the patients were sentenced for felonies and three of these were psychopathic personalities.

DISCUSSION.

LEROY MAEDER.—We find that only 6.7 per cent of the number of patients that were studied were found to be sex delinquent. It seems, at first that we should be surprised at the small percentage. However, Dr. Ruskin points out that there was a definite selectivity in that the courts might have sent sex delinquents to penal institutions unless there was a definite, outstanding psychosis. With the general impairment both physically and psychologically we could account for some of this small percentage. The type of offense is, as we would expect, that of perversion or types of offenses that would pertain to the pre-genital period of psychosexual development.

I was particularly interested to note that the majority of the patients had a poor home environment. It is our experience in dealing with children in children's agencies to find sex delinquencies where there has been a poor home environment and particularly where there has been a lack of adequate guidance in terms of knowledge regarding sex, but more particularly a lack of adequate guidance in the development of social relationships. It seems as though this normal curiosity of childhood, or this thirst for knowledge, if not satisfied through both intellectual knowledge as the question is posed, and also a proper social environment, that a good deal of this energy which would ordinarily be satisfied through adequate information would be short-circuited into aggressive acts or acts of exhibitionism. Many of these aggressive acts take the form of sex delinquencies. We have had the experience in cases of this sort of finding that when we put the child in an adequate home where he had the warm and satisfying familial relationships and also was given knowledge regarding sex in the proper way, that many of these delinquencies disappeared.

The type of sex delinquency as related to the psychiatric diagnosis also takes the relationship which we would expect; for instance in the schizophrenic group we find predominance toward homosexuality, molesting women and physical assault. We know that in the schizophrenics we have more of a turning of interest toward oneself, more narcissistic tendencies and therefore we would expect more in the nature of homosexuality where there is sexual overactivity. In the seniles and the arteriosclerotics, we find that individuals regress in terms of their sex delinquencies to earlier types of sex behavior—behavior that might be explained in terms of satisfaction of the earlier partial impulses in exhibitionism.

All in all it seems that the type of delinquency, therefore, follows largely along the lines that we would expect in terms of psychiatric diagnosis and our knowledge of the psychosexual development of the individual.

PHILIP Q. ROCHE, M.D. (Philadelphia, Pa.).—Dr. Ruskin's well-considered paper will have particular interest to those engaged in the special field of legal psychiatry, and to those to whom the statistical method applied to criminal problems has appeal.

Through the courtesy of Dr. Charles A. Zeller, I was supplied with the statistical analysis of the home factors of sex delinquency in psychotic offenders from the State Hospital for the Criminal Insane, Waymart, Pennsylvania. It is notable that the percentage of sex delinquents in this institution is the same as revealed by Dr. Ruskin's analysis of the male population in Eloise Hospital. This coincidence seems to point to the assumption that by the present procedures of commitment in both Michigan and Pennsylvania the same number of psychotic male sex delinquents are removed from free circulation. Again, in the comparison of respective hospital data, one notes a striking statistical coincidence in the factors of *marital status, original home conditions, and age grouping*. It would seem from this that psychotic sex delinquents in Michigan do not differ from those in Pennsylvania, and it seems likely that the statistical similarity comes out of the fact that our method is the same. I suspect that an analysis of the *non-psychotic* sex delinquents confined in our penal institutions would yield the same factor co-incidence and that such factors operate in the same proportion in most categories of delinquency. Dr. Ruskin states that "sex delinquency is apparently a function of psychosis in general and not of any type in particular," and I should venture to believe that one can go a step further and say that delinquency of any variety is apparently a function of psychosis in general and not of any type in particular.

I suspect that a broad statistical survey of mental and penal institutions would yield data not far at variance with those supplied by Dr. Ruskin's study. Yet there are several considerations that have place in our discussion. Thus, there are many individuals designated sex delinquents who by psychiatric standards are not actually sex delinquents. Again, a too large number of persons are convicted on sex offenses on the basis of children's testimony and out of the curious bias of juries in regard to the female witness. I have personal knowledge of a number of young men sent to the Penitentiary for long terms, convicted of the offense of "rape," the validity of which is open to question, and the wisdom of their punishment open to reservation.

Nine per cent of our total Eastern State Penitentiary population is registered as sex delinquents, yet many other offenders officially convicted of other crimes yield histories of sexual obliquity and may sooner or later reveal such in either the compressed homosexual atmosphere of the penal institution or in subsequent offenses. In our ostensibly non-psychotic group of sex delinquents a sparse 15 per cent may be considered average in intelligence, and therefore one may say that sex delinquency is also a function of mental deficiency with the same assurance that one may say it is of psychosis in general. The majority of both our psychotic and non-psychotic sex delinquents exhibit in common, infantile affective and volitional attributes, and their sex behavior is only one of the several aspects of the delinquent personality, which I prefer to believe is fundamentally the neurotic personality.

I should like to raise the question as to whether any statistical analysis of delinquency should not include other behavior categories, particularly the crimes against the person; namely, assault and battery and assault to kill and murder, all of which in my experience have a significant element of sex, perhaps more easily elicited from the psychotic than from the non-psychotic offender.

The hazard of any statistical approach to the criminal problem lies in the fact that the official legal category of the offender may be created out of pure chance. Out of the vagaries of justice one may find himself either in a state hospital or in a penal institution. The law has no concern for the individual save for the brief moment of trial and conviction—save for one act out of many equally or more significant acts. The law is no Menschenkenner; it is concerned only in the isolated abstraction.

I hope the time will soon come when the whole problem of delinquency and especially sex delinquency will be rid of the present confusion which is largely created out of the incompatibility of inflexible legalism and free scientific inquiry.

Correspondence.

The subjoined letter was submitted by Dr. D. Ewen Cameron of Albany. It will be noted that this letter from England was written six months ago and Dr. Cameron suggests that its interest lies mainly in its portrayal of a phase through which the people of England have passed and of attitudes which probably no longer obtain. The lessons however, may be useful for those on this continent concerned with the problem of psychiatry in war time.

THE CASSEL HOSPITAL FOR FUNCTIONAL NERVOUS DISORDERS.

SWAYLANDS, PENHURST, KENT.

July 18, 1940.

DEAR DR. CAMERON:

Your letter of the 20th of June has set me a very difficult problem. My answer is bound to be affected by two important sets of factors.

In the first place it is hard for an individual to form valid general conclusions in time of war. One's perspective is limited in many ways. The curtailment of travel limits the informal personal interchange of views, and places and people once close at hand seem very far away. Smaller groups take the place of larger ones and the way is paved for rumours and exaggerations.

In the second place our own ideas have changed so rapidly that they have not had time to crystallize and may be distorted by emotion and wishful thinking. In fact, in many respects you have had a better chance of forming judgments than we have, and you must bear this in mind when reading my letter.

We have made a number of obvious mistakes on the psychological side. One serious error has been a failure to arrange an adequate psychological examination for the new recruits for the army. We should have learned the lesson of the last war better than that, but the point does not need further comment in this place.

Another error has been an excessive concentration of the public mind on "safety first." I can speak now in the past tense for it is rapidly being amended. There has been far too much talk of where to hide and how to protect one's own skin, of keeping up the morale of the nation, of preventing panic, etc. There has been far too little talk of how to defeat the enemy. People were getting the feeling that one had only to sit and wait long enough for the enemy to be defeated without personal danger. This

was the philosophy of the Maginot line, and it was a psychological disaster. It led to the feeling that we had only to produce enough machines, enough concrete, enough aeroplanes, and to pour out enough money to win the war. Initiative tended to be stifled, and the men who would wield the machines with aggressiveness and decision were not allowed to come forward.

In war time one lives to such an extent in sharp psychological contrasts that one may be justified in a rather sweeping generalisation. I would say therefore that the forces which are released in war tend to express themselves either as aggression, which at its best brings enterprise, vigour and daring together with a necessary disregard of personal safety; or the reverse may happen leading to an attitude of submissiveness and passivity (relieved only by grumbling!). This is expressed collectively by a pious attitude of obeying orders, an emphasis on the defensive, a secret fear and over-estimation of the enemy and a lack of personal initiative. It is an attitude which is probably commoner among older people. It may appear superficially admirable, leading to phrases about "sparing lives," "certainty of victory," etc.; but it breaks down badly in the face of unexpected difficulty or reverse. The result is either the collapse of resistance or panic.

The Germans seem to have grasped this need to draw forth and utilise the aggressive impulses of their people. Some years ago a German said to me "There are no shoemakers in Germany any more. They are all fighters on the shoe-making front."

Incidentally, we have been feeling very conscious of the moral rot which had permeated European democracy. Democracy as you know very readily becomes a synonym for selfishness. It ought to breed the higher type of patriotism, the best form of collective responsibility. It often leads to an attitude of "What do I get?" with a disregard of "What can I give?" Such people do not readily adapt themselves to war conditions (except as profiteers!). They are afraid of danger and above all unwilling to do their share in the national effort.

The general preparation that I would stress therefore would be a mobilisation of the aggressive impulses of the people along certain defined and pre-conceived channels. I would conduct a campaign to make people conscious of certain fundamental issues, and to make them willing to work for those issues. First I would put those things which people should be willing to work or to die *for*. These would have to be expressed in various terms: (a) in moral terms for the individual who is accustomed to think in terms of moral rather than of national issues; (b) in national terms, including pride of country, and in that country's free institutions; (c) in local terms involving in many ways the deepest feelings of all. Those who have been quite apathetic will in our experience be powerfully moved by something which threatens the sanctity of their own part of the country (not by any means necessarily their own property).

All these feelings have to be positively aroused, they must not just be allowed to drift into life. Clearly, writers and advertising experts could help much more than they have been allowed to at present. To take the crudest form of this kind of preparedness, we have not had a single good slogan, or even a good tune to sing since this war began!

Next comes that which we stand *against*,—this needs no comment from me since indirectly Lincoln said it all for you at Gettysburg.

Some people still need to be shown that liberty and license are not the same thing; that freedom is not the right to do exactly as you please, and that conscription is entirely compatible with democracy!

Turning now from the general to the particular, it seems necessary to give each individual as far as possible an active part to play (I am speaking of course entirely of the civilian population). He must develop a sense of his own active participation in what is being done and he needs simple and positive instruction. I would say here in parenthesis that we have found it a great mistake to be afraid of giving orders. Our own voluntary organizations were at first far too polite, and were conducted on a basis of "Would you mind doing this?" This has lately given place to a more definite series of commands to those who have joined such organizations, and as a result everyone is a great deal happier.

To return to my main theme, in peace time even in the absence of organized government effort much can be done by enterprising societies in all sorts of ways. Training in first aid, instructions in modern methods of warfare, the nature and effects of high explosives and gases, all these should not be kept as a mystery from the average citizen; he should be encouraged to understand as much about them as is reasonably possible. He should also be taught the importance of the so-called fifth column in modern war, and what measures are necessary to counteract it. He should be made to realize that total war does not imply the haphazard release of gigantic forces of destruction, but something far more cunning than that, namely, the use of every possible weapon to achieve a given limited objective. Rumour and so-called propaganda are powerful weapons which have been used in Europe with terrible effect. There is scope here for a citizen army pledged to check rumour and subversive propaganda as near the source as possible. Such a citizen army should work completely in the open. Its members should make it their business to acquire all possible information about current events relating to defence or emergency matters. They should be prepared to challenge rumours with pertinent questions, such as, "How do you know?" "Who told you that?" etc.

Our own A. R. P. services have given opportunities for responsibility and service to large numbers of citizens in a voluntary capacity and have fulfilled psychological as much as material needs.

I hope I have said enough to indicate that in my opinion the best remedies against panic and disruption lie in the active participation of as large a section of the population as possible. I have probably said nothing that does not seem perfectly obvious, but it is the obvious which is so often not done.

I hope that my letter will reach you and that we may one day renew our acquaintance in pleasanter circumstances. Please make whatever use you like of my letter.

Yours sincerely,
C. H. ROGERSON.

Comment.

PSYCHIATRY AND THE WAR.

The disastrous consequences of psychiatric disabilities in reducing the effectiveness of the armed forces in time of war, and the part which psychiatry can and must play in military medicine were clearly demonstrated during the World War of 1914-1918.

The old style army medical examination was indeed a misnomer. What the recruit received was a *physical* examination. A complete *medical* examination obviously must include an appraisal of mental health and status as well as physical.

When the United States took up arms in that war she was able to take advantage of the experience of the other belligerents, particularly Canada, then in their third year of fighting, and in the medical establishment of the A. E. F. the services of psychologists and psychiatrists were freely utilized.

Again the United States is mobilizing. Plans have been made for supplying the necessary psychiatric services. Dr. Harry A. Steckel, director of the Syracuse Psychopathic Hospital and chairman of the Military Mobilization Committee of The American Psychiatric Association has prepared a brief statement of the present situation and the more important steps so far taken. Here is Dr. Steckel's statement:

PSYCHIATRY AND THE NATIONAL DEFENSE.

We are gratified to report to our members that psychiatry is receiving much deserved recognition in the national defense program. During World War I psychiatry as a specialty in military medicine was still an infant in swaddling clothes. We believe it has at last come of age.

Through the concerted efforts of the William Alanson White Psychiatric Foundation, the Southern Psychiatric Association and the Committee on Military Mobilization of The American Psychiatric Association, psychiatric advisory service has been made available to all interested national groups.

The Selective Service System, under the able direction of Dr. Clarence Dykstra, is fully aware of the importance of eliminating psychiatric risks from the rapidly expanding armed forces.

To this end seminars on psychiatric aspects of military mobilization have been planned for the month of January to be held in Washington, D. C., Boston, Philadelphia, New York, Pittsburgh, Buffalo, Chicago, Atlanta, Cincinnati, St. Louis and Dallas.

While these seminars are intended primarily for medical advisory board and army induction board psychiatrists, medical members of local draft boards are also invited and to some sessions lay members of local boards as well.

The teaching staffs of these seminars are composed of teams of three physicians—one from the Army Medical Corps who discusses military aspects of the problem, one from the Veterans Administration who outlines the psychiatric experiences of his group and one psychiatrist of national reputation who will emphasize the practical application of psychiatric principles in a broad sense. Many, indeed most of these men, are members of our Association and all well known and prominent in their respective fields.

Specific instructions along psychiatric lines have been issued to each local board and their medical examiners and at least one qualified psychiatrist is to be included on each of the seven hundred medical advisory boards.

Our committee on military mobilization has been able to furnish the Surgeon General of the Army a list of all psychiatrists between the ages of twenty-five to thirty-five years from which it is hoped approximately one hundred may be secured for immediate extended active service.

Likewise recommendations of qualified personnel for the Navy have recently been made.

Our Association is cooperating with the Committee on Neuropsychiatry of the Division of Medical Sciences, National Research Council, of which Dr. Winfred Overholser is chairman, and the chairman of our own mobilization committee is chairman of the sub-committee on personnel and training under Dr. Overholser's group. Thus has been established a wholesome liaison between the various groups all of whom are working to a common end and in this manner duplication of effort is avoided.

Briefly, therefore, we may safely say that the costly lessons of World War I will not remain buried in the national archives of that conflict, that the position psychiatry won on the fields of France has not only been consolidated in the past twenty years but that we are prepared and are destined to make continued progress into a vastly larger and only partially explored field of usefulness.

Psychiatry has heard the clarion call to duty and it shall not be found wanting.

At the annual meeting of this Association in 1940 Captain Dallas G. Sutton (M. C.), of the U. S. Navy read a paper on "Naval Psychiatric Problems." Leading the discussion Dr. Shelton G. Silverburg of the Veterans Administration presented the problem from the standpoint of the Army. These gentlemen made it clear that the grave importance of mental health and personality

fitness of enlisted men is fully recognized and that to this end psychiatric services are an essential part of the medical establishment.

Commenting upon these contributions Colonel J. R. Rees, writing from London in December, says: "I was extremely interested in the paper by Captain Sutton and in the discussion which followed it, for we have been going through all the tiresome business of weeding out the men who were inadequately sorted by recruiting boards."

That the United States intends to profit by the experiences gained in the last war and to make suitable use of psychiatric collaboration is indicated by the program of the Selective Service System alluded to in Dr. Steckel's statement. Colonel L. G. Rowntree, in charge of the Medical Division of Selective Service, in a letter enclosing the program of the first Seminar for Medical Advisory Board and Army Induction Board Psychiatrists, held at Washington, January 2-3, 1941, writes:

This is the first of a series of meetings at various centers of population through which we hope to improve and unify the psychiatric classification of registrants, and at the same time prevent public misunderstanding and resulting damage to the adaptive capabilities of those deemed unsuited to the military vocation.

The first seminar was noteworthy. Dr. Winfred Overholser presided and distinguished speakers participated. The first session was opened by Director Dykstra, whose presence as initial speaker was more than symbolic. He was followed by Dr. Llewellys Barker whose topic was "The Mission of the Psychiatrist." Lt. Col. William C. Porter, M. C., U. S. A., spoke on "Military Psychiatry and the Selective Service." Dr. Martin Cooley discussed "Psychiatric Experiences of the Veterans Administration." Dr. Harry Stack Sullivan presented "Practical Psychiatry" for informal discussion through one of the sessions. Dr. James Stuart Plant spoke on "The Psychiatric Challenge in Selective Service." The Honorable Paul V. McNutt, Federal Security Administrator and Coordinator of Health, Welfare and Related Defense Activities, addressed the conference on "What We Expect of Psychiatry in this National Defense Program."

The second day of the seminar was devoted to the consideration of various mental conditions most likely to cause problems in

military service. These were discussed by Doctors Roscoe W. Hall, Alexander Simon, Lauren Smith, Spafford Ackerly, Dexter M. Bullard and Winfred Overholser.

Through the kindness of Dr. Sullivan the situation with respect to the place of psychiatry in the expansion of the armed forces is realistically set forth in the supplement, "Psychiatric Mobilization in the U. S. A." which accompanied the November issue of the JOURNAL.

So much for preparations in the United States.

In the present number of the JOURNAL Dr. William Baillie presents a discussion of psychiatric and neurological liabilities among enlisted men in the Canadian Army during the first year of the present war. Dr. Baillie is particularly qualified to speak on this subject by reason of his war and post-war experience. Three years combatant officer in the Canadian Expeditionary Force, during two years battalion officer in charge of training all infantry services, he later served two years as O. C. the Neurological Center at Toronto and since 1919 has been in charge of the neuropsychiatric service at the Christie Street Hospital, main diagnostic and treatment center of the Department of Pensions and National Health.

Dr. Baillie has analyzed in considerable detail 200 consecutive hospital admissions and the individual cases can be followed in his tables, which have been reproduced in full in order to indicate clearly the basis for his conclusions. He expresses the opinion that one-third of these cases should have been recognized at enlistment as unsuitable for military service, and that almost another third should have been obvious during a comparatively brief preliminary training period, had organized neuropsychiatric services been available.

It may be offered as a simple business proposition that men should not be employed for work they are unfit to undertake, and who sooner or later become liabilities because of such unfitness, and later still contentious pension problems.

There may be enthusiasts who would carry psychiatric scrutiny of recruits to extremes or who would sell to the government infeasible mental hygiene schemes. Such promotions sometimes emanate from non-medical sources. They tend to discredit the

real service which the psychiatrist can render. That all unsuitable cases should be discovered at the beginning no one could expect or require, nor would it be advocated that all potentially neurotic or border cases should be indiscriminately rejected. All material which can be fitted into the military organization should be utilized.

Conservative opinion might be formulated somewhat as follows:

1. With adequate psychiatric instruction it should be possible for medical boards to recognize and reject on application for enlistment a high proportion of candidates who are unsuitable by reason of mental or neurological conditions.

2. Doubtful or border cases might be accepted for probationary training under special observation, their fitness or unfitness to be determined reasonably early as result of such special observation.

3. Those judged unfit during preliminary training period should be eliminated; others might be assigned to special training or duty as indicated.

4. Psychopaths as such should not necessarily be discharged from the service. They should be assigned to special duty in special units under special discipline—Spartan discipline.

5. There should be scrupulous avoidance of any attitude which would suggest or encourage the idea that minor psychiatric findings, vague nervous conditions or complaints are grounds for rejection or discharge.

News and Notes.

MOTION PICTURE FILMS FOR THE ANNUAL MEETING.—At the meeting in Richmond, as at previous meetings, motion pictures will be shown in a separate room. All those having films which they believe will be of interest to any particular group are requested to communicate with Dr. J. D. Reichard, U. S. Public Health Service Hospital, Lexington, Kentucky. Please advise Dr. Reichard the length or the running time of your film. Only 16 mm. silent film can be handled. Unless notifications are received on or before April first, 1941, the showing of your film on a definite schedule cannot be guaranteed.

THE AMERICAN ORTHOPSYCHIATRIC ASSOCIATION MEETING.—The eighteenth annual meeting of the American Orthopsychiatric Association, an organization for the study and treatment of behavior and its disorders, will be held at the Hotel Pennsylvania, New York City, February 20, 21 and 22, 1941. A registration fee will be charged for non-members. Preliminary program will be sent on request. Inquiries may be directed to Helen P. Langner, M. D., Chairman, Publicity Committee, 1790 Broadway, New York City.

NEURO-PSYCHIATRIC INSTITUTE OF THE HARTFORD RETREAT, LECTURE SERIES.—The eighth annual series of lectures at the Hartford Retreat opened December 4, running weekly to December 18, and resuming January 8, 1941, to continue to February 19.

The opening lecture was by Dr. Lothar Kalinowski of the New York State Psychiatric Institute, formerly of the University of Rome. Dr. Kalinowski's topic was "Electric Shock Therapy." Succeeding speakers in this series were Dr. Nolan D. C. Lewis on "Prospects in Psychiatric Research," Dr. Cornelius G. Dyke on "Roentgenology of the Brain," Dr. Harold T. Hyman on "The

Five Day Treatment of Syphilis," Dr. Walter Freeman on "The Treatment of Mental Disease by Frontal Lobe Surgery," Dr. Edward A. Strecker on "Treatment of Alcoholism," Dr. H. H. Jasper on "Recent Developments in Electroencephalography," Dr. Leo M. Davidoff on "Diagnosis and Treatment of Brain Tumors," Dr. Robert A. Cooke on "Allergy in Relation to Mental and Nervous Diseases," Dr. Tracy J. Putnam, on "The Treatment of the Epilepsies."

SUFFOLK (N. Y.) COUNTY DEPARTMENT OF HEALTH, DIVISION OF MENTAL HYGIENE.—Dr. A. T. Davis, commissioner of health of the County of Suffolk, announces that on October 30, 1940, the Suffolk County Board of Supervisors placed in the budget of the Suffolk County Department of Health, the sum of \$17,525 for the establishment of a Division of Mental Hygiene in the County Department of Health.

The personnel will consist of a psychiatrist, psychologist and two psychiatric social workers, together with a clerk and provision is made for their necessary transportation and office expense.

It is hoped to have this unit functioning by January, 1, 1941.

THE NEW ENGLAND SOCIETY OF PSYCHIATRY.—The regular fall meeting of the New England Society of Psychiatry was held at the Northampton State Hospital on Thursday, October 24, 1940. Approximately one hundred and fifty members attended.

The morning was given over to inspection of the hospital. Luncheon was served at 1:00 p. m. in the hospital cafeteria. Dr. Roy D. Halloran, superintendent of the Metropolitan State Hospital, Waltham, Massachusetts, presided at the afternoon meeting.

At this meeting there were elected to membership the following physicians: Bessie F. Brown, Wrentham, Mass.; Richard C. Cooke, Waltham, Mass.; Emerick Friedman, Norwich, Conn.; Patrick J. Meehan, Tewksbury, Mass.; and Margaret R. Simpson, Foxboro, Mass.

Memorial resolutions were read regarding the deaths of: G. Alder Blumer, Providence, R. I.; Martin W. Peck, Boston, Mass.; and Mary Theresa Muldoon, Waverley, Mass.

Dr. D. Ewen Cameron, professor of neurology and psychiatry at Albany Medical School, Albany, New York, presented a very interesting paper entitled, "The Influence of the Times on the Teaching of Psychiatry" in which he emphasized the need for a reorientation of concepts made necessary by changing conditions of community life and by modern work upon causative factors in abnormal mental states.

SCIENTIFIC EXHIBIT AT THE ANNUAL MEETING, RICHMOND, VIRGINIA.—Several spaces for exhibits are still available in the Scientific Exhibit. Those having material of interest to any particular group are requested to obtain application blanks from Dr. Walter L. Bruetsch, Central State Hospital, Indianapolis, Indiana.

REPORT OF NOMINATING COMMITTEE, AMERICAN PSYCHIATRIC ASSOCIATION.—In accordance with the provisions of Article VI of the Constitution of The American Psychiatric Association, the Nominating Committee herewith unanimously reports the nominations for officers of the Association for consideration and action at the 97th annual meeting to be held in Richmond, Virginia, May 5 to 9, 1941.

The Executive Committee requested the Nominating Committee to include also a candidate for the office of President to replace President-Elect, H. Douglas Singer, M. D., deceased.

For President: James K. Hall, M. D., Virginia.

For President-Elect: Arthur H. Ruggles, M. D., Rhode Island.

For Secretary-Treasurer: Winfred Overholser, M. D., D. C.

For Councillors for three years: G. H. Stevenson, M. D., Canada; Roscoe W. Hall, M. D., D. C.; J. D. Reichard, M. D., Kentucky; Karl Menninger, M. D., Kansas.

For Auditor for three years: Chester Carlisle, M. D., California.

WILLIAM C. SANDY, M. D., *Chairman*,
HARVIE DEJ. COGHILL, M. D.,
GARLAND H. PACE, M. D.,
THEOPHILE RAPHAEL, M. D.
KENNETH J. TILLOTSON, M. D.

PSYCHIATRIC MONOGRAPHS.—The Department of Institutions of the State of California announces the publication of a series of *Psychiatric Monographs*, to be issued at irregular intervals.

The main purpose of this new monograph series is to provide a medium for the prompt publication of psychiatric, psychologic and sociologic studies by members of the staffs of the institutions in the jurisdiction of this Department.

The editorial board will receive also for consideration, with a view to possible publication in the series, manuscripts embodying original contributions to the science and practice of psychiatry, including such contiguous fields as neurosurgery, genetics, psychology, criminology, sociology and the like, from universities, hospitals, and other institutions anywhere.

The first number of the new series, "The Etiology of Child Behavior Difficulties, Juvenile Delinquency, and Adult Criminality with Special Reference to Their Occurrence in Twins," by Aaron J. Rosanoff, Leva M. Handy and Isabel Rosanoff Plesset, is now ready for distribution. This is a study of 409 pairs of twins, of whom one or both in each pair exhibited child behavior difficulties, juvenile delinquency or adult criminality.

The monographs are expected to vary in size, and will be priced accordingly. The price of the first issue is \$1.00 per copy. Subscriptions will not be received. Standing orders for delivery of future issues will be accepted and placed on file until countermanded. Orders for the current monograph, and standing orders for future issues should be addressed to the Supervisor of Documents, Sacramento, California.

Correspondence regarding editorial matters should be addressed to the editor, Dr. Aaron J. Rosanoff, Department of Institutions, Sacramento, California.

THE COMMONWEALTH FUND ANNUAL REPORT.—For the year ending September 30, 1940, there are reported appropriations for philanthropic purposes approximating \$2,000,000. A third of this amount went into medical research and education and nearly one-half into other health services.

It is noteworthy that among the teaching projects supported by the Fund five hospitals received grants to provide liaison arrangements between pediatrics and psychiatry to enable pediatricians to

secure training in the management of the emotional problems of children and to establish psychiatric consultation service for current cases.

On request of the Philadelphia County Medical Society and the Philadelphia Bar Association ("The Pennsylvania Plan," this JOURNAL, July 1940, p. 227), the Fund granted two fellowships for two years study of criminological psychiatry at the University of Pennsylvania.

A sum amounting to \$135,000 was appropriated to meet special war needs through the American Red Cross, the Allied Relief Fund (now the British War Relief Society), the Finnish Relief Fund, the Harvard Medical School Epidemiological Commission to England, and also for the assistance of English refugees.

The effect of the war is seen in the fact that the number of Britons studying in this country as Commonwealth Fund fellows has been reduced from a normal quota of 65 to 16.

The report states that the Child Guidance Council supported by the Fund to promote mental hygiene for children in England has been even more active than in peacetime, this work having proved its usefulness among children evacuated from London and other cities. The Child Guidance Council has also benefited by a special appropriation by the British Government for mental health during the war.

GERONTOLOGY.—The National Institute of Health of the United States Public Health Service is organizing a new unit for research into the problems of aging. The study of the aging process (gerontology) necessarily includes the study of diseases of the aged and their treatment (geriatrics).

The problems of aging fall into three major fields: (1) the biology of senescence as a process, (2) the human clinical problems of aging and associate pathological states both mental and physical, (3) the socio-economic problems of the shifting age distribution in the population. The National Institute of Health is concerned with the first two of these divisions of the science.

In order to advise this new Unit, there has been formed a National Advisory Committee on Gerontology, representative of the scientific thought of the nation. This Committee includes:

Dr. L. R. Thompson, director, National Institute of Health, U. S. Public Health Service.

- Dr. Anton J. Carlson, physiologist, University of Chicago, National Research Council.
- Dr. Charles L. Christiernin, Association of Life Insurance Medical Directors of America; medical director, Metropolitan Life Insurance Co.
- Dr. Robert A. Coker, zoologist, University of North Carolina.
- Dr. William Crocker, botanist, Boyce Thompson Institute of Plant Research.
- Mr. Lawrence K. Frank, sociologist, Josiah Macy, Jr. Foundation.
- Dr. A. Baird Hastings, biochemist, Harvard University.
- Dr. Ludvig Hektoen, pathologist; consultant, National Cancer Institute, U. S. Public Health Service.
- Dr. Winfred Overholser, psychiatrist; superintendent, St. Elizabeths Hospital.
- Dr. Clarence Selby, industrial physician, General Motors Corporation.
- Dr. William D. Stroud, clinician, Philadelphia, Pa.

The first undertaking of the Unit on Gerontology is a survey of present or projected investigations in this field in American scientific institutions. It is desired also to include indirectly related studies in the basic biologic sciences. From the clinical viewpoint the Unit is mainly interested in studies directed toward health evaluation, mensuration of functional capacity (criteria of "physiologic age"), and in the diseases characteristic of later life ("degenerative disorders").

By means of this survey it is hoped to bring into closer cooperation investigators interested in related problems in this broad field, and particularly to promote interest in a vitally important but hitherto relatively neglected area of scientific study.

The National Institute of Health earnestly solicits information concerning studies now being carried on or proposed. Letters may be addressed to Dr. Edward J. Stieglitz, in charge Investigations in Gerontology, National Institute of Health, U. S. Public Health Service, Bethesda, Md.

PSYCHIATRIC UNIT FOR CHARITY HOSPITAL OF THE STATE OF LOUISIANA IN NEW ORLEANS.—By the terms of the will of the late Miss Celanire Correjolles a substantial legacy has been left to the Board of Administrators of the Charity Hospital for the purpose of erecting a building suitable for medical purposes to supplement the present hospital group. It is the wish of the Board of Administrators to utilize this legacy for the construction of a psychiatric unit and it is hoped that it may be supplemented by a federal grant in order that a clinic thoroughly adequate for treat-

ment, teaching and research may be provided. The new hospital building will be known as The Joseph Lenex and Josephine Correlles Lenex Memorial.

THOMAS WILLIAM SALMON MEMORIAL LECTURES.—The eighth series of the Salmon Memorial Lectures were delivered by Nolan D. C. Lewis, M. D., professor of psychiatry, College of Physicians and Surgeons, Columbia University, at the New York Academy of Medicine, November 8, 15 and 22, 1940.

The general subject of Dr. Lewis' lectures was "Pathways of Psychiatric Research."

The first lecture was devoted to the task of tracing the various philosophic trends, prescientific endeavors and scientific beginnings from ancient times through the Grecian and Roman eras, through the Middle Ages, and through the productive years that followed, in order to detect, if possible, the early manifestations of types of thoughts which later by modification became focused in the research plans of the laboratory and clinic. This historical survey included ancient demonology, the early Chinese, Hindu, Egyptian and Greek concepts, the teachings of the pythagorians and of the hippocratic school, the contributions of the periods of Plato and Aristotle, the developments of the galenic period and of the so-called "Dark Ages," and finally the English, German, French and Italian psychiatric concepts of the seventeenth and eighteenth centuries.

The second lecture dealt with the leading psychiatric contributions and the growth of research in this field during the nineteenth and twentieth centuries. They were described and evaluated in the light of what had gone before, as well as in relation to the growth of other biological sciences. The neuropsychiatric activity of the nineteenth century which is sometimes referred to as the "descriptive period" of psychiatry includes the work of Pinel, Esquirol, Kraepelin, Wernicke and many of their noted contemporaries in German, French and English neurology and psychiatry. The twentieth century psychology, the Italian and Russian neuropsychiatry, and modern ramifications in psychiatric thought and research as expressed in the pavlovian school, the psychoanalytic movement, psychobiology, and the applications of anatomopathology, physi-

ology, biophysics, biochemistry and experimental psychology in psychiatric problems were discussed.

The third lecture presented the prospects for future achievements in psychiatric research. It pointed out that the orientation gained from past accomplishments and present status of psychiatry should enable us to formulate tentatively some plans for future action and progress, and to suggest additional procedures that might be applied. The natural evolution of research problems, the applications of the scientific method, the possible contributions from anthropology and sociology, special research leads, and the importance of promoting and supporting psychiatric investigation were among the issues stressed.

The history of the growth of knowledge has followed a characteristic trend which can best be understood by the actual research worker at work, as in struggling through the mechanics of a problem one recapitulates the whole scope and past of what has accumulated. The principles and general rules must be understood, and this understanding constitutes the essential focus in training in any particular discipline, rather than the intellectually wasteful efforts too frequently spent on gathering details and facts that must be stored in memory or formed into units having a limited application. The task is not simplified by any means by the tendency of many psychiatric as well as other investigators who become deeply involved in a point of view into which they attempt to bring a large number of apparently diverse phenomena.

The aim in any historical study of psychiatry should be to obtain the basic ideas and principles beneath the massive accumulation of apparently unrelated facts. The search for these base lines is often tedious, but it not infrequently yields a rich harvest in the interpretation of human affairs.

The lectures of Dr. Lewis will be published *in extenso* in book form.

REPORT ON STANDARDS AND POLICIES.—The Committee on Standards and Policies of which Dr. Frederick W. Parsons is chairman, has now made available a revision of the 1925 report of that committee. Hospital planning and procedure throughout the country have been based upon the standards set up by this report.

Copies of the 1940 revision may be obtained by addressing Mr. Austin M. Davies at the headquarters of the Association, Room 708, 9 Rockefeller Plaza, New York City.

BIOCHEMISTRY AND PHYSIOLOGY IN RELATION TO MENTAL DISEASE.—In conjunction with the meetings of the A. A. A. S. in Philadelphia, a discussion on biochemistry and physiology in relation to mental disease was held at the Institute of the Pennsylvania Hospital, December 31, 1940. Dr. Nolan D. C. Lewis presided and reports were presented by Drs. D. W. Bronk, E. Gellhorn, H. E. Himwich, R. W. Gerard, L. F. Nims, E. Spiegel, E. B. Tietz and W. S. McCulloch.

The problems of mental activity and disease were discussed from widely different standpoints. Studies on the effects of chemical and physical agents on the activity of nerve fibres and ganglionic synapses led to the conclusion that changing chemical environment and past nervous activity produce fluctuating behavior patterns in a nervous system which has a rigid structural pattern. Studies of the effects, on the sympathetic and parasympathetic nervous systems, of various treatments and drugs which influence psychoses suggested that mental derangement may be linked with maladjustment of the autonomic systems. That proper functioning of the brain is dependent upon normal oxygen utilization was emphasized by observations on the oxygen removed from the blood circulating in the brain under various conditions and by *in vitro* studies. Reports on changes in cell permeability and sudden alterations in pH of brain tissue during insulin hypoglycemia emphasized the physiological interest of insulin shock treatment.

FELLOWSHIP OPPORTUNITIES.—A limited number of fellowships have been provided by The Commonwealth Fund and other sources for training in extramural, especially child psychiatry. These fellowships are to be administered by The National Committee for Mental Hygiene, through whom fellows are to be assigned for one or two years to a selected child guidance clinic, the term and plan of the fellowship to be determined by the peculiar needs of the fellows. Candidates for fellowship award should have had at least

two years of psychiatry in an approved mental hospital, in addition to other qualities fitting them for extramural service. These fellowships come in response to a definite paucity of personnel in this field. Accordingly, other conditions as to age, sex, marital status, etc., must be governed by individual cases and by the nature of current demand. Requests for further information about these fellowships, and applications therefor, should be addressed to Dr. Milton E. Kirkpatrick, The National Committee for Mental Hygiene, Room 916, 1790 Broadway, New York, N. Y.

Book Reviews.

STUDIES IN TOPOLOGICAL AND VECTOR PSYCHOLOGY I. By Kurt Lewin, Ronald Lippitt and Sibylle Korsch Escalona. (Iowa City, Iowa: Univ. of Iowa Press, 1940.)

This work, which consists of three papers, a theoretical study by Lewin and experimental studies by Lippitt and Escalona, "is planned both as a new start and as a continuation" of the series of twenty papers edited by Lewin and published during the years 1926-1937 in the *Psychologische Forschung* as *Untersuchungen zur Handlungs- und Affekt-Psychologie*.

In "Formalization and Progress in Psychology," Lewin defends himself against two main criticisms. It has been charged that he first developed an elaborate theoretical and mathematical system and then set out to discover facts to fit it. To this he replies that as a psychologist his interest is the obtaining of knowledge about psychological processes, and that he agrees with his critics that theory and mathematization are simply means toward this end. That the development of his theory has proceeded gradually and on the basis of experimental fact rather than in advance of it he shows quite convincingly by a review of the actual history of his work, beginning with his attempt to refine Ach's measures of "strength of will" and his resulting discovery, contrary to his expectation, that the laws of association were inadequate. His later work, with its "dynamic" theory, grew out of the positive assumption to which his criticism of association led: the correlation of intentions with needs or the setting up of tensions.

Against the claim that some of his experiments have involved too few subjects Lewin contends that his conclusions have stood up well under independent attempts at verification, and that in some instances it is a better choice when the facts point in a certain direction to determine whether other kinds of facts will point in the same direction, rather than to make more exact quantitative measures of the first findings. The latter point is illustrated by a brilliant logical and mathematical exposition of Zeigarnik's well-known experiments on the recall of completed and incompleted tasks, which is the most valuable contribution of the paper. Interesting and important as this analysis is, however, it will probably not meet the original objection. What is worrisome about the small number of subjects used, let us say, by Zeigarnik in one of her experiments, is not whether a certain ratio is 1.9 rather than 2.1, but rather whether the ratio is sufficiently greater than 1.0 not to be accounted for by errors of random sampling. This cannot well be decided by other experiments which come to the same theoretical conclusions on the basis of quite different facts.

Lippitt presents "An Experimental Study of the Effect of Democratic and Authoritarian Group Atmospheres." The author, acting as "leader" of each

of two groups of five children, volunteer members of "clubs" formed ostensibly for the purpose of making papier maché masks, studied the effects upon the groups and their members of the atmospheres he attempted to induce. Among his conclusions are that in the authoritarian group, as contrasted with the democratic, there were greater resistance to the leader, more potent individual goals, more conflict among the individual members, less feeling of group belongingness, less creative production, and a more hostile attitude toward life in the group. The experiment needs to be regarded sympathetically as exploratory, though quite elaborate in attempted controls. It is exceedingly difficult to evaluate the facts for reliability, in spite of the evident care with which the work was done. With one individual acting both as experimenter and "leader" in such an experiment, one cannot avoid asking how the conclusions may be influenced by that individual's own ideology. One wonders what conclusions would have been reached in a similar experiment carried out (even with the best will in the world) in Germany or Russia. Complete justice is not done, however, by this criticism of an experiment which accomplishes much in the way of breaking ground in a difficult field.

The concept of level of aspiration has aroused much interest since its first experimental study by Hoppe. In "The Effect of Success and Failure upon the Level of Aspiration and Behavior in Manic-Depressive Psychoses," Escalona compares the behavior of a group of normal subjects, a group of manic-depressive patients, manic type, and a group of manic-depressive patients, depressed type. If, as they are frequently described, manics tend to be overconfident of their own powers and depressives the reverse, characteristic differences in level of aspiration could be expected. It was found necessary for some comparisons to distinguish among depressed cases the types of *motor* retardation from those of *decision* retardation. Comparing manics with the whole group of depressives, however, it was concluded that "the manics had a greater mobility of the level of aspiration and a shorter duration of choice." Depressives appeared to be more influenced by duty and social pressure, and their levels of aspiration were at least to that extent less directly affected by success and failure in the experimental situation.

Both Lippitt and Escalona have dealt with very difficult problems. It is therefore natural, but still injurious to the objectivity of their experiments, that in spite of many quantitative results each is forced to rely so often upon qualitative observations which must frequently have little technical reliability. As for the numerous topological representations, it is probable that they will fascinate some readers and be disregarded by others. The reviewer finds the diagrams for the level of aspiration experiment more meaningful and stimulating toward further deduction than those for the political atmosphere experiment, although this may be because there are more well-established facts and well-defined concepts in the former than in the latter.

FRANCIS W. IRWIN, PH. D.,
University of Pennsylvania.

A HANDBOOK OF ELEMENTARY PSYCHOBIOLOGY AND PSYCHIATRY. By Edward G. Billings, M. D. (New York: The Macmillan Company, 1939.)

This pocket volume contains 271 pages but is only 6½ inches by 4½ inches. It is divided into five parts: (1) Psychobiology; (2) Psychiatric Examination Procedures; (3) General Psychopathology; (4) General Principles of Psychotherapy; (5) Selected References.

In general, it may be said that the book is well written, readable and very practical. The formulations are those of Adolf Meyer, and except for Muncie's larger textbook, it is the only one following consistently Meyer's theories throughout. As a handbook, however, much has been condensed and it cannot be recommended for the beginner. It will, undoubtedly, be found very useful for those preparing for the American Board in Psychiatry and Neurology. It is an excellent book for the psychiatric intern to carry about in his pocket for reference. It cannot, however, fill the place of the more extended textbooks on the subject.

The psychiatric examination procedures, in general, are excellently set forth. Emphasis is placed on discrimination in taking a history or conducting an examination and leaving out non-essentials. The following quotation, as representing excellent advice to the beginner in psychiatry, is worthy of constant repetition—"Traditionally, therapy is the dramatic side of medicine, and examination the drudgery. It is too often forgotten that the successful therapist is successful primarily because he is a master of examination procedure that he *uses*."

It seems unfortunate that in recommending stories for repetition the author gives the cowboy story in detail. The reviewer would, at this time, like to protest the inclusion of the cowboy story in psychiatric examination technique. After trying it out for many years on interns as normal controls, it is obvious that certain distortions occur and that a special standard of normality must be established if the story is to be used.

Under the examination procedure for children, it is interesting to note that the Rorschach test is not mentioned.

The description of feeble-mindedness is perhaps as unsatisfactory as any. Apparently some of the older standard definitions about psychometric tests are used without adequate appreciation of the more recent work. We are not told how to determine the I. Q. for adults. The material given obviously applies only to children but it is not made clear that such is the case. The recent divergence in standardizing for adults at 14, 15, and 16 year levels is not mentioned. A moron is said to have a mental age of 7 to 12 years with an I. Q. of 50 to 70. If, however, we accept 16 as representing an I. Q. of 100, a mental age of 12 years would give an I. Q. of 75. We are told that the dull normal group have I. Q.'s of 85 to 95. If applied to adults and using the 16 year level, an I. Q. of 87 represents average intelligence. The impression is given that the determination of feeble-mindedness is purely a question of psychometric tests, an attitude to which the late Dr. Fernald objected most strenuously. In Massachusetts, for example, the Fernald

scheme of the ten-point examination, the tenth point of which is the psychometric test, is generally used in the determination of feeble-mindedness. For these reasons the reviewer feels that the section on feeble-mindedness is not satisfactory.

In the description of different types of drug poisoning, the picture is given in very specific fashion. Undoubtedly, the necessity for condensing has caused this, but it appears to the reviewer that a false impression is given as to the extremely specific type of deliria produced by certain drugs. The statements that paraldehyde delirium "is characterized by confusion and convulsions"; that "chloral hydrate produces an interesting delirium in that the patient is relatively quiet and watches with interest the small animals and men that he visually hallucinates only in the darkness"; and that "barbiturates do not often cause delirium. Stupor and coma are more common occurrences. When delirium does occur, it is similar to delirium tremens punctuated by convulsions," are all conclusions concerning which the reviewer would express considerable doubt.

The criticisms mentioned are all fairly trivial as compared with the generally excellent presentation. It is felt that the book fills a long felt need for a handy little volume in psychiatry which can be carried about for ready reference and for reviewing the subject.

K. M. B.

AN ANNOTATED BIBLIOGRAPHY OF MENTAL TESTS AND SCALES. Volume I.
By Charles K. A. Wang, Ph. D. (Peiping, China: Catholic University Press, 1939.)

Although many mental test bibliographies of various sorts are now available, there is certainly none which is at once so ambitious in its scope and so meticulous in its documentation as this descriptive catalogue prepared by the professor of psychology at the Catholic University of Peiping, China.

The purpose of the bibliography is to provide a complete reference manual covering "all instruments of mental measurement available in the English language up to 1939." In this first volume, 1776 such instruments are listed, classified and described. The annotation in the case of each item includes: name of author; name of test; date of publication; age, grade or type of subject for which intended; purpose, form, materials, etc.; evidence of reliability and validity (if available); standardization and norms; publisher; price; and selected references to the relevant literature. The three parts of the present volume deal with instruments for the measurement of: I. Mental Capacity, II. Personality and Character, III. Vocational Aptitudes and Abilities. (Part IV on The Measurement of Educational Achievement is not included.) There is both a subject and an author index.

To those who are not familiar with the ever-increasing literature on mental tests, this lengthy bibliography may prove both surprising and dismaying. To those who are familiar with this field, the book should prove a useful index for quick reference to half-forgotten test devices as well as a source of concise, pertinent information on test material not previously noted. It is,

of course, of special interest that this product of long and painstaking research should come from what we have grown accustomed to think of as "war-torn China."

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BEYOND THE CLINICAL FRONTIERS. By *Edward A. Strecker, M. D.* (New York: W. W. Norton & Co., 1940.)

In "Beyond the Clinical Frontiers" Dr. Strecker has produced a very interesting and valuable study of the behavior of crowds. In his foreword he makes a modest apology, but in his essay he ably upholds the already high traditions of the Salmon Lecture Series.

At this time of world stress his work has added interest and value. He begins with a discussion of "massive retreat from reality," as exemplified by the various psychotic and other related reactions. This is his point of departure for a discussion of similar phenomena in the crowd. Next, there is a discussion of some of the more frequent and obvious reality evasions encountered in everyday life, along with some of the devices which aid in this evasion.

Dr. Strecker now sketches the operation of the mind of the crowd, first along rather broad lines and then more specifically, correlating the thinking of the masses with that of the individual average normal man and with that of mentally ill patients. The operation of various mental mechanisms, such as repression, rationalization, compensation and the like are discussed. The tendency toward paranoid thinking is especially emphasized in connection with present-day affairs. The lessons taught us by mentally ill patients are next briefly discussed. This leads to the consideration of first, the need for mental hygiene and later, the feasibility. The indications are broad and far-reaching—just as pertinent for the group as for the individual.

In the final chapter on mental hygiene planning, the author points out various ways whereby the lessons learned from the study of abnormal behavior in individuals can be applied to the aid of society.

As a postscript, he makes certain prophecies, quoting from Martin, Tayler and White.

W. W. ELGIN, M. D.,
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CRIME AND SOCIETY; An Introduction to Criminology. By *Nathaniel L. Cantor.* (New York: Henry Holt and Co., 1939.)

The course of one who would write upon criminology is a somewhat perilous one. He may bear far to the left and become involved in psychoanalysis and psychobiology. There are many fascinating theories as to the etiology of crime—we may explore the vortices of the unconscious and come forth laden with Oedipus complexes, incestuous wishes, feelings of guilt, feelings of inferiority, insecurity, and many other speculative spoils,

and who shall say us nay? Or we may keep to the starboard and deal with the solid rocks of statistics, so many criminals from the slums, so many from the suburbs, so many with an I. Q. of less than 100, so many paroled, so many recidivists, etc.

In the present volume Professor Cantor has steered a middle course rather neatly, avoiding both Scylla and Charybdis although it is easy to see that he has no especial love for psychoanalysis. His present volume is a detailed, and yet sufficiently succinct, presentation of the facts as elicited so far, with an indication of the problem presented. The present reviewer is not aware of a better volume to serve as an introduction for the student in criminology and aid in orientation.

There is a quite sufficient history of criminology, followed by a discussion of the criminal himself. The writer is careful to emphasize the rôle of variables in studying criminals. In this and other connections he says a great many things that have been well said before, but this is, of course, no fault in a textbook; for example, that there are many kinds of murderers, arsonists, rapists, etc., and that though both may be called larcenists, there is a vast difference between the skulker who steals an unguarded pile of junk from a lot and the cashier who embezzles from a bank.

One should not insist, however, upon too much individuality. There is, after all, a hierarchy of crime. At the top of the heap, and corresponding roughly to the county families in England, and the "four hundred" in America, are the high-class confidence men, the stock swindlers and the blackmailers; at the bottom the "moll-buzzers" who snatch women's pocket-books and the "rollers" who go over a drunken man in a gutter for what small change they can find. And it must be remembered that if we examine a certain number of criminals of each type we will find a certain number of common factors, just as we will if we examine a number of bankers, lawyers, school-teachers or doctors. This does not mean, of course, that we can lay out any generalized rules of treatment for murderers, or rapists, or arsonists. Each case is an individual problem just as, in a somewhat more limited sense, each patient of the family physician requires a special technique, according to his temperament, his environment, his idiosyncrasies, etc.

Some idea of the scope of Professor Cantor's work may be had by a glance at the contents. He alludes to the causes of crime, insisting, as is his wont, that these vary with the individual and that, with all due regard to the maleficent effect of slums and dirt, poverty and overcrowding, a good thing may still come out of Nazareth. Indeed, the author might have cited a well-known namesake of his to prove this point.

His discussion of the machinery of the law is quite adequate; the procedure of court trial, the function of the judge, the jury, the district attorney, etc., are all quite familiar to the initiate, but no doubt sufficiently informative for the student.

His discussion of prisons is especially good. He has pointed out with great acumen the faults in the present system, the regimentation, the lack of occupation, the failure, in a large sense, to do anything at all to rehabili-

tate the prisoner. Although he, himself, confesses that he has no panacea, he indicts the present social system with the charge that the present methods are worse than useless so far as decreasing crime, or preventing recidivists.

The present attitude of society towards the handling of delinquents he justly says, may be regarded as an attempt at the punishment of immoral acts committed by wilful individuals with evil intent. Truly, an archaic concept in the light of our present knowledge of human behavior!

In the last part of his book Professor Cantor somewhat diffidently discusses the problem of crime prevention. His thesis is that the aim is to provide in the individual a sense of security and/or adequacy. He emphasizes the value of child guidance clinics, *for adults*, which he says, "would probably be more effective in preventing juvenile delinquency than all the playgrounds, clubs, parks, Big Brother and Big Sister movements added together."

In short, Professor Cantor's book may be safely recommended to the student of criminology. It will give him a sound orientation in the subject and provide him with a solid foundation upon which he may later elect to build any sort of superstructure.

JOHN E. LIND, M. D.,

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CALIFORNIA TESTS OF MENTAL MATURITY (Short Form). Devised by *Elizabeth T. Sullivan, Willis W. Clark and Ernest W. Tiegs*. (Los Angeles: California Test Bureau, 3636 Beverly Blvd., 1939.)

This series is an outgrowth of the earlier California tests, retaining the Language and Non-Language features of the longer edition, and including a Pre-Test of Visual Acuity. Forms are available for five levels: Pre-primary, Primary, Elementary Grades (4-8), Intermediate Grades (7-10) and Advanced (Grade 9-Adult). The time required is an ordinary class period, and norms are furnished which give Language, Non-Language and Combined I. Q.'s. The standardization appears to be indicative rather than final, and the claims for the tests are based partly upon factor analysis. The subdivision into Language and Non-Language categories would seem to be most pertinent at the lower level, and should everywhere be used with caution. The manuals give clear directions, and reflect the authors' point of view on the nature of intellectual development. This point of view, called a multiple-factor theory of intelligence, is not sufficiently elaborated to be harmful. The tests themselves will probably prove to be quite useful, particularly at the intermediate level, and under circumstances that normally give reliable results.

W. LINE, PH. D.,

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THE FAILING STUDENT: A Study of Academic Failure and the Implications for Education. By *Kenneth L. Heaton and Vivian Weedon*. (Chicago: The University of Chicago Press, 1939.)

The above represents a study of some nine hundred students from four Michigan colleges who had been placed on probation for scholastic reasons. The objective was a very practical one, namely to ascertain from as many approaches as possible the reasons for these scholastic failures and, through cooperative endeavor with the students themselves, to determine to what extent performance could be improved. This investigation was very carefully and exhaustively carried out and represents a valuable body of integrated data and interpretation. The implication of such matters as relationship of psychological test scores to academic success, reading ability, study habits and skills, financial and remunerative work problems, vocational motivation, physical health, personal and social factors, and relationship of sex to academic effectiveness were all extensively explored and evaluated. The authors conclude that a thorough-going guidance program is definitely indicated for college students as opposed to perfunctory and partial approaches. This type of guidance program should not only be diagnostic but ought, in addition, to afford means over a sufficient period for actual reconstructive and remedial effort, taking into account all of the aspects and elements involved. This monograph is highly recommended to all interested in the important question of student counselling and guidance. The reviewer feels, the psychiatric approach as such, which might have added not a little to the completeness of the study, unfortunately was not included.

T. R.

PERSONAL AGGRESSIVENESS AND WAR. *E. F. M. Durbin and John Bowlby*. (New York: Columbia University Press, 1939.)

This essay attempts to explain the basis of war in terms of the aggressive impulses of the individual. With its documentation from child and animal studies it is an advance over the old interpretation of war as the expression of the instinct of pugnacity. The advance lies in tracing the development of aggressiveness through the socialization process which inducts the child into the group. But this progress in accounting for personal combativeness is scarcely great enough to enable the authors to keep abreast of current thought in social psychology and sociology. Their exposition suffers from the same cardinal error as the instinct explanation in making the single individual the prototype of complex social processes. Modern war is not the summation of the aggressive impulses of the individuals involved. It is a complicated pattern of relationships. The individual in the modern world too often does not get into war because of his aggressiveness but in spite of it. Many of the rank and file in Germany went into the present war, not because their aggressive impulses got the better of them, but because they were so docile that they allowed themselves to be regimented into a social system whose object was military conquest. Because the element of physical

force is common to a world war and to two boys engaged in fisticuffs is not sufficient reason to equate the two events and seek a common explanation.

In fairness to the authors it should be pointed out that they honestly acknowledge some of the limitations of their approach. They state that they are not trying to explain the origins of any specific war but rather to give a general account of the psychological forces which make war possible. And they admit that they should not treat nations as simple homogeneous groups because: "Power in them is divided between many groups and dispersed over a varying proportion of the members of the nation. The analysis of the group structure within the nation and of the distribution of power among the sub-groups is a task for sociology and sociologists. We are not competent to perform it" (p. 28). It is to be doubted, however, that any general psychological explanation of war can be valid and informative if it omits the psychological analysis of group structure and hence of group conflict itself.

The authors present evidence to show that the aggression of the adult is related to his frustration in accepting social sanctions as a child. They even go so far as to argue that frustration in adult life, as in the case of the Germans following Versailles, contributes to aggressiveness. In short almost at the point where the social psychologist would like to see them begin their study of the problem they modestly retire in favor of the historian who can account for specific wars and of the sociologist who understands the nature of social organization. It is a pity that the authors are so modest. If they had gone further, they would have found that the social structure, which the sociologist mistakenly reifies, consists of the complicated relationships of human beings, and the complex of historical forces comprises the motives and behavior of men in interaction—all rich psychological material which the psychologist has as much right to study and interpret as the social scientist.

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PSICOLOGIA DELLE SENSAZIONI ORGANICHE. (Two vols.) By *Ettore Galli*.
(Napoli: Casa Editrice Rondinella Alfredo, 1939.)

The author has presented the subject of "organic sensations" in two comparatively large volumes comprising a total of nearly a thousand pages. After introducing the problem of the nature and character of sensations in a general way, several historical classifications of these phenomena are given, including those of Magendie, Luciani, Titchener, Bain and Beaunis; following which the author presents his own classification. This arrangement includes the following topics:

- I. Sensations of the digestive apparatus; oral; gastric; intestinal.
- II. Respiratory sensations.
- III. Circulatory sensations; cardiac; vascular.
- IV. Secretive sensations; skin, mammary, lacrimal, salivary, gastric.
- V. Sensations of urinary apparatus.

- VI. Sexual sensations.
- VII. Local and diffuse nervous sensations: tickling, itching, toxic reactions, etc.
- VIII. Neuro-electric sensations.
- IX. Labyrinthine and vestibular sensations.
- X. Sensations of muscles, tendons and joints.

Each principal system of the body thus represented is further appropriately subdivided and dealt with extensively in the chapters. For example, the chapter devoted to the oral sensations discusses teeth, mastication, sucking, swallowing, etc., in terms of pressure, irritation, pain, temperature, and other physical, physiological and psychological situations.

Each volume contains ten chapters, which follow the author's classification rather consistently in titles and order. Chapters IX, X, XI, XII and XIII deal with the numerous sensations of the sexual apparatus in all of its functions. Volume II is concerned largely with the nervous system itself, the last seven of the ten chapters being devoted to this subject, where in addition to the consideration of the usual physiological components, there are discussions of coenesthesia, volition, attention, emotions, the lowering and raising of psychic tension, and analyses of sensations, alcoholic intoxications and sensations in toxic convulsions. Electromagnetic sensibility and primary and secondary sensations in the muscles, tendons and joints are described in detail.

The material presented is so extensive that an inclusive, comprehensive review is difficult to make. An unusual number and variety of normal and pathological organic sensory situations are discussed with psychological values and implications always in the foreground. The work is also characterized by its survey of the literature on all topics related to its main objective.

There is no index but the subject matter is so captioned and subdivided, and the tables of contents so complete, as to enable the reader to locate readily special topics when using the book for reference. This encyclopedic work on a subject of interest to psychologists, psychiatrists, neurologists and physiologists may be recommended to the workers in these sciences. It is practically alone in its field.

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BIOGRAPHIES OF CHILD DEVELOPMENT. By *Arnold Gesell, et al.* (New York: Paul B. Hoeber, Inc., 1939.)

This report on the mental growth of 84 infants and children represents a ten-year study from the Yale Clinic of Child Development. Part I (chapters I to IV) by Dr. Gesell, gives the point of view of the book, and discusses comparatively trends in early and later development, illustrated by carefully selected case histories. Part II (chapters V and VI), by Catherine S.

Amatruda, Burton M. Castner and Helen Thompson, presents individual studies of behavior growth, and draws certain general conclusions from these concerning the individuality of growth careers.

The Yale Clinic has examined some 10,000 infants and children within the last twenty-five years. Many of these were studied at repeated intervals. From the records, a selection has been made with a view to offering instructive cases and information to those interested in the practical and theoretical problems of child management. Cases with irregular or atypical development receive more attention than run-of-mine children; but at the same time, the problems presented and discussed are, in the main, of wide general interest.

It is difficult to do justice to this volume in a short review. The interested reader will find in each case history a considerable amount of fascinating and definitely stimulating material. Insofar as any comprehensive thesis emerges, it is that later development can be predicted, along certain potentials at least, with a degree of accuracy that is indeed encouraging—provided that the predictions are based upon discerning observations. Even individuality often shows itself in infancy significantly for prediction purposes, and, again, along some lines more than others. So that, on the whole, the report gives considerable evidence of the validity and solidarity of the objective observational approach to the field of child development.

In addition to the general thesis, almost every page of the book reflects some challenging tentative suggestions, such as the following (used as illustrations rather than as any attempt to be comprehensive): that diagnostic aspects are more sure in regard to the positive aspects of growth and development; that early indications of general intellectual calibre are very helpful to prediction, although there are numerous indications that later intellectual status may surpass earlier expectancy; that, in the present state of our educational knowledge, prediction concerning physical development is, in general, less valid than is the case in the mental realm; that "when the organism is under stress of distortion, because of unfavorable conditions, then its ultimate adjustments as expressed in growth characteristics become least predictable," etc.

The summary chapter of Part I lists some of the concepts and principles which underlie developmental diagnosis in infant behavior. Here the emphasis is frankly upon hereditary and constitutional factors. These factors, we are told, "do not operate independently of post-natal environmental influences, social and physical, but they determine the direction and scope of such influences." Maturation imparts "characteristic trend, tempo and general configuration to the early behavior patterning," and "the resultant characteristicness is amenable to cumulative diagnosis."

In similar vein, the final chapter on "Individuality" states that we pay vastly too much attention to mere training and instruction, and affirms that "our central task, particularly in the first five years of life, is to discover and to respect individuality."

While the emphases here selected can hardly be gainsaid in the sense in which the authors interpret them, they none the less point to a need

for a much more refined and dynamic educational understanding of development than at present exists. In the interests of careful analytical objective observation, and especially of prediction, it is natural to find a diagnostic approach to problems of child development that stresses growth and growth potentials in constitutional terms, and regards environmental stimulation as being directly related (or even ministering to) these potentials. The positive educational influences, receiving less attention in their own right, are likely to be deemed clear on an elementary commonsense level. While this latter point often represents a considerable advance upon current practices, there is none the less a great need at the present time for a more truly psychological approach to the dynamics of development; for only then will the wider aspirations of modern education, at all levels, be clarified and guided by science, and the concepts of development be made applicable in a vital sense to the years following childhood and adolescence. The aim of dynamic psychology, as expressed by Allport, for example, is to be increasingly able to predict what can be accomplished with an individual, rather than what he (because of physical or mental constitution) will become. This point of view is in marked contrast with that of the volume under review—not in being contrary, of course, but only in being complementary. It is one, however, to which the whole field of child study must give increasing attention.

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PSYCHIATRIC NURSING TECHNIC. By *A. E. Bennett, M. D., and Avis B. Purdy, R. N.* (Philadelphia, F. A. Davis Co., 1940.)

This book is just what the title implies, a handbook for practical reference on the psychiatric ward; and an excellent handbook it appears to be. The authors state that it is not a textbook, but only a manual of technical psychiatric nursing procedures. It has, however, been impossible for them to avoid indicating a very desirable philosophy and attitude which increase the value of the book.

The first chapters deal with methods of approach to psychiatric patients. Subsequent ones discuss methods of ward management and of the treatment of mental symptoms, giving in detail the nursing technics of all the procedures involved. The last part of the book is devoted to the technic of making and recording observations. There is also a very useful chapter on the private duty nurse and the psychiatric patient.

The choice of illustrations is rather surprising. Although no historical résumé is given, pictures of ancient barbaric treatment alternate with photographs of the newest methods. It is possible that this might be misleading to inexperienced student nurses.

On the whole, this should be a very useful book to have available on the ward, both for purposes of orienting the constantly changing student personnel, and also for quick reference by the more experienced nurse.

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THE PARTICIPATION OF MEDICAL SOCIAL WORKERS IN THE TEACHING OF MEDICAL STUDENTS. Prepared by *Harriet M. Bartlett* for the Educational Committee of the American Association of Medical Social Workers. (Chicago: George Banta Publishing Co., 1939.)

The publication of this small book indicates a widening interest in the part played by social and environmental influences as a cause of illness. Medical social workers are being called upon to participate in medical teaching, and are in need of a guide in undertaking these new responsibilities. This book is based upon a study of the teaching activities in ten American medical schools where medical social work has been introduced into the curriculum.

The task of the social worker is not to teach social work, but to give medical students certain concepts and skills which are valuable in the care of patients. The various requirements both of organization and of preparation for the teaching of medical students are stated. Methods, objectives and programs are discussed, and a wise and sound attitude regarding the relations of doctors and social workers is set forth, which should do much in developing among medical students a widened view of medical problems and a better understanding of mental hygiene. This book should serve to point the way not only for medical social workers, but also for those interested in institutional medical practice.

G. CANBY ROBINSON, M. D.,
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PSYCHOTHERAPY. By *Lewellys F. Barker, M. D.* (New York and London: D. Appleton-Century Co., Inc., 1940.)

Dr. Barker, now Emeritus Professor of Medicine in Johns Hopkins University, was one of the early medical educators who recognized and stressed the significance of psychic factors in various types of illness and who incorporated scientific psychotherapy in the treatment program.

In writing the present handbook—one of the Appleton Popular Health Series, to which Dr. Barker has contributed several other volumes—the author draws upon his experience of many years, as well as presenting a survey of the more conspicuous methods or schools of psychotherapy which the physician should at least know something about.

The book might be described as a concise guide to the whole business of dealing with the patient, including history-taking, examination, the comprehensive diagnosis, determination of treatment indications, application of appropriate procedures. It is clear that psyche and soma are not distinct entities which can be considered separately and that all treatment must meet the requirements of the psychosomatic organism as a whole and in relation to its environment. "We must keep ever in mind the fact that in a patient we have to deal with a highly complicated, integrated body-mind unit, and that disturbances on any level of the integration—*anatomical, physiological, neurological or psychobiological*—will exert effects upon the whole unit."

There is a brief historical résumé of the modern period, including the teachings of Charcot, Bernheim, Janet, Dubois, Coué, Weir Mitchell, Cabot and others. In some detail the different varieties of psychoanalysis are outlined as developed by Freud, Adler, Jung, Rank, Steckel. Avoiding however "the internecine strife among the 'isms'" Barker expresses his preference for the "distributive analysis and synthesis" of Meyer as practiced in the Phipps Clinic. "In general it is in accord with the kind of practice for which I have appealed during the past forty years, for, comprehensive in both diagnosis and treatment, it stays close to the facts of observation."

Barker's final word on psychoanalysis may or may not be worth quoting, according to the reader's bias. Here it is:

"Orthodox Freudian psychoanalysts give the impression that they practice the only kind of psychotherapy worthy of the name. But there were good psychotherapists long before Freud, men who, thoroughly trained medically, knew the human heart, had strong personalities and were endowed with wisdom. Though grateful for the contributions that psychoanalytic workers have made, we should not over-estimate them. It would indeed be regrettable if we had no ways of helping nervous patients except the time-robbing and purse-impoverishing method of so-called orthodox psychoanalysis. Methods undergo change with time and with fashion."

A brief chapter is devoted to psychotherapy of "organic" diseases. To the question whether psychotherapy can exert any direct influence upon the organic processes themselves, the author makes categorical reply: "The answer is No." But there are maladjustments resulting from the organic lesions which may be corrected, unwholesome habits of mind which may be modifiable, unwarranted attitudes toward the disability which may be rectified. Illustrative examples are cited of the beneficial effects of psychotherapy in cases of severe organic disease.

The author reviews the common types of functional nervous disorder with psychotherapeutic procedures appropriate to each. There is also a discussion of methods suitable to different life epochs. Here will be found practical commonsense advice regarding the mental hygiene of childhood and adolescence. The counsel on marital problems is sound enough, but rather stereotyped and superficial and by no means adequately covers the subject.

Barker believes that the physician or surgeon who does not supplement his special techniques with psychotherapeutic methods is not giving the patient all to which he is entitled or which he may need. His conservative and practical attitude in the whole matter is summed up in his definition of psychotherapy—"Treatment that attempts to improve the condition of a human being by means of influences that are brought to bear upon his mind."

In place also are his words of caution: "The use of psychotherapy, like that of other healing methods by the unskilled is a very real danger, particularly when persons without medical and psychiatric training try to earn money by it."

As an introduction to the subject this book will serve well the medical student and practicing physician. With the principles it lays down they should unquestionably be familiar.

The work is happily dedicated to Dr. Stewart Paton, another great teacher and pioneer in psychiatric research, "whose foresight in introducing work in mental hygiene among college students should always be remembered."

C. B. F.

In Memoriam.

H. DOUGLAS SINGER.

1875-1940.

Dr. H. Douglas Singer was born January 7, 1875, in London, England. After graduating from the Merchant Taylor's school he studied medicine at the University of London Medical School and obtained, in 1900, the position of a resident physician at the Queens Square National Hospital for Paralytics and Epileptics. There he was for several years associated with Hughlings Jackson and Sir William Gowers. In 1904, he took up his residence in the United States and became associate professor of neurology in Creighton University School of Medicine, Omaha, Nebraska, serving at the same time as assistant superintendent of the Norfolk State Hospital (Nebraska). In 1907, he was offered the position of director of the newly created State Psychopathic Institute of Illinois and continued in this office until 1920. In the meantime he was appointed state alienist (1917), and was at the same time special examiner for the Illinois Exemption Board, advisory consultant in neuropsychiatry to the Surgeon General of the United States Public Health Service and, from 1919 to 1922, advisory consultant for the U. S. Veterans Bureau. Since 1919 he was professor of psychiatry of the University of Illinois College of Medicine. In 1934 he was appointed editor-in-chief of the *Archives of Neurology and Psychiatry*. On Wednesday, August 28, 1940, when he died in consequence of an automobile accident, he was president of the American Board of Psychiatry and Neurology, president of the American Neurological Association and president-elect of The American Psychiatric Association.

It might be proper to list the memorable events and significant accomplishments in Dr. Singer's life. However, events are few and accomplishments too numerous for a brief evaluation. It is characteristic of Dr. Singer that those who knew him have little information about eventful happenings. He seldom if ever spoke of them. They were past and he lived in the present and future.



DR. H. DOUGLAS SINGER.

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What counted with him were accomplishments, ambitions and plans. His personal experiences were largely ignored by him. The almost dangerous extent to which he neglected his subjective feelings is aptly illustrated by a letter to one of his associates which was found among his papers. Judging by the time elements which it mentions it seems to have been written on August 28, the day of his death. After describing briefly a few details of the automobile accident, the letter continues, "My right knee was much hurt and a few days later a clot separated and landed in my left lung. I am now in St. Joseph's hospital in Albuquerque and am told I must stay in bed two more weeks from now. The lung is doing all right—no infection, but the knee still is not right and I don't want any more emboli. Hence, I may be a week or so late in getting back to Chicago." The style of this letter symbolizes the style of the man. With one embolus lodged in his lung and others threatening to invade further territory his one dominating thought is that he "may be a week or so late in getting back." With regard to the lung damage, which is already menacing life, his comment is almost facetious: "I don't want any more emboli." Subjective discomfort and personal danger are ruthlessly discounted. What matters are objective duties and accomplishment rather than subjective feelings and personal destiny.

Objectivity was the keynote of Dr. Singer's personality. He was objective to a fault. As editor he stressed objectivity of style, and as a teacher, objectivity of description. "I wish there was a way of disposing of adjectives," he said, "Adjectives tell the subjective side of the story; they express feelings and opinions and ought to be avoided whenever possible." As an exponent of the principle of objectivity he was violently opposed to the use of superlatives. The surest means of antagonizing him was to incorporate in a clinical record the adverbs "very," "extremely," or "exceedingly." The clinical records had to be models of objectivity, even down to the choice of linguistic detail.

It was Dr. Singer's passion for objectivity which drove him to devise a new method of classification. He frequently voiced his admiration for Kraepelin's work. But Kraepelinian classification was largely based on mental contents; hence, it was permeated with a spirit of subjectivity. Kraepelin described the personality of the patient rather than his disease. And a psychiatry which deserved the name of a clinical discipline had to deal with diseases,

not merely with persons who were ill. This clear distinction between the sickness and the person who is sick was the cornerstone of the system which Dr. Singer was ready to embody in a textbook when a cruel fate put an end to his scientific effort. The system of psychiatry which was to be his crowning scientific achievement was clearly mapped out in his fertile mind, and work on it was to be started after his return from the last fatal journey. The case records which he intended to consult were prepared for his use when death robbed him of his last triumph. Objectivity means and requires patient weighing of facts and the capacity to wait for results. Dr. Singer was a master in the art of weighing and waiting. When, in 1907, he arrived in Illinois to reorganize the medical service in the state hospitals he found a situation that was far from encouraging. The hospitals were overcrowded, ill equipped and poorly staffed. The system was that of custodial care, with custody enforced and care relaxed. Into this system he was expected to infuse the spirit of scientific alertness and administrative integrity. When he died in August 1940 the goal was far advanced on the road to achievement, largely due to his supreme capacity to weigh facts carefully and to wait patiently for results.

Dr. Singer left many pupils, foremost among them Dr. Lewis L. Pollock and Dr. Charles F. Read. He also had many friends, foremost among them Mr. A. L. Bowen, director of the State Department of Public Welfare. In close cooperation with Mr. Bowen he conceived his plans for the improvement of the service in the state hospitals. For thirty-three years, the two worked loyally together, both inspired by an indomitable will and possessed with the singular capacity to weigh facts carefully and to wait patiently for results.

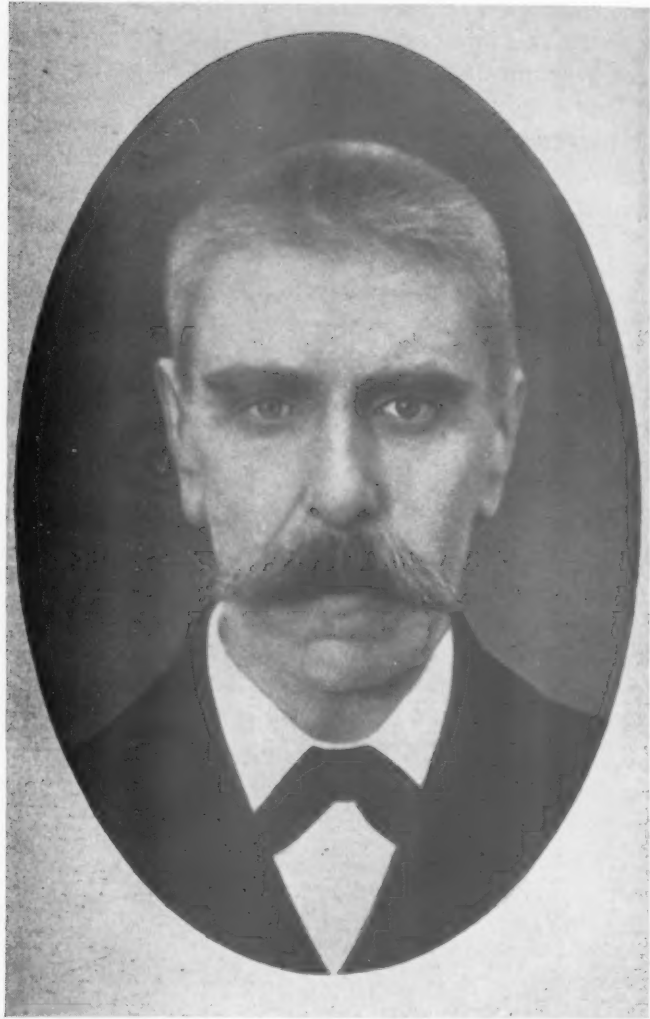
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DR. JULIUS WAGNER-JAUREGG.

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JULIUS WAGNER-JAUREGG.

1857-1940.

Wagner-Jauregg died on October 1, 1940, at the age of 83. His name will long be honored throughout the world, because he showed that fever has a curative effect on syphilis of the central nervous system. In his native land he will be remembered for this and for contributions to the problems of mental and physical health in Austria. One of his major contributions which is not so well known to the outside world as his fever treatment was on endemic goitre and cretinism. It was due to his efforts that all salt sold in Austria since 1922 contains a small percentage of sodium or potassium iodide, with a resulting decrease in the incidence of goitre. He was intensely interested in the laws concerning the insane and the inheritance of mental disease. He described the clinical picture of amentia which was not well known before his publication.

Wagner-Jauregg was born in Wels, Upper Austria, on March 7, 1857, the son of a high state official. He graduated from the University of Vienna in 1880, and spent the next few years in pathology under S. Stricker and under Leydesdorff. He was made dozent in psychiatry and neurology in 1885, and his rise in the field of neurology was meteoric. He was appointed head of the psychiatric and neurologic clinic in Graz, over the head of many better known men in 1889. He returned to Vienna in 1893 as head of the psychiatric clinic and on the death of Kraft-Ebing he became the director of the neurologic-psychiatric clinic of the University of Vienna. His years as the chief of this clinic were very active ones and it was during them that all of his important contributions were made. He retired as head of the clinic on reaching his seventieth year, but continued to work until shortly before his death.

In 1927 he was awarded the Nobel prize in medicine for his work on the fever treatment of dementia paralytica. This epoch-making discovery did not come as a sudden inspiration, but was the result of years of painstaking labor. In 1887 he published an article on the influence of febrile diseases on psychosis. This was

followed in 1891 by the use of Koch's tuberculin as a means of producing fever in patients with dementia paralytica. The results were not conclusive, and there was much adverse criticism. This criticism did not influence his opinion, but on the contrary it aroused his anger and spurred him to further work. He tried various other methods of producing fever and in 1917 started the use of inoculation malaria. Soon after the end of the World War there were favorable reports from clinics throughout Germany and within a few years his fever therapy was used throughout the entire world. In his speech of acceptance of the Nobel prize Wagner-Jauregg stated that exceptional intelligence is not needed in the achievement of a great discovery, but continuous application to a problem would bring the truth to light.

He was an excellent writer, a persevering research worker, and an enthusiastic teacher. He was fixed in his opinions and occasionally appeared to be unduly stubborn to his colleagues. He was alarmed by the tendency of modern psychiatry to become isolated from the general body of medicine, and had little faith in the "psychiatrist". He described their writings as "literature, but not medicine." During the war as director of the Medical Corps, he assigned one of the internationally famous Viennese psychiatrists to a hospital which contained primarily typhus patients and remarked that these psychiatrists should learn that there is a body as well as a soul.

Wagner-Jauregg's personal life was isolated from his work. He had few close personal friends, but to these he was very loyal. He was an enthusiastic tourist and mountain-climber, and is credited with making several dangerous first ascents in the Alps.

H. HOUSTON MERRITT, M. D.